amateur radio

MARCH, 1974

- FT 101 MODIFICATIONS
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- 2 METRE BAND PLAN
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JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

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SPECIFICATION

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A Coil 0.44—1.3MHz
B Coil 1.3—4.3MHz
C Coil 4.14MHz
D Coil 14.40MHz
F Coil 120-280MHz
Transistor: 3 TR's & 1 Diode
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Battery: 9V (BL-006P)
Dimensions: 180x80x40mm
Weight: 730g

Price $36.50
P & P $1.00

DELUXE AUDIO GENERATOR — Model HE-22D

SPECIFICATION

Freq. Range: Sin: 20Hz-200kHz
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Output Voltage: Sine: 7 volt.
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Output Impedance: 1000 ohm
Freq. Accuracy +3% + 2Hz
Distortion: Les than 2%
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4 Ranges—1/1, 1/10, 1/100, 1/1K

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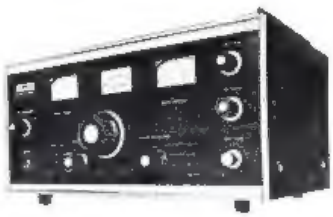
GENERAL COVERAGE & AMATEUR COMMUNICATIONS RECEIVERS

TRIO 9R-59DS



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Dial has 7 separate band TE-20D covers 120kHz — 500MHz (6 Fundamental Bands & 1 Harmonic Band)
Freq. Accuracy: + or—2%
Audio Output: to 8 volt
Internal Modulate: 400Hz approx.
Tube: 12BH7A, 6AR5
Power Source: 105-125V, 220-240V AC 50/60Hz, 12 watts

TE-20D employs a Xtal socket and can be used as below.
a.—Self-Calibration
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Small size-Space Saving.
Printed Circuit for a uniform characteristics.
Dimensions: 140x215x170mm
Weight: 2.8kg.

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Standard 2 Circuit Phone Plug PMG Type **30c**
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amateur radio

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CONTENTS

FRONT COVER

Caught with meters on the 'hop' on 20 SSB during the National Field Day is John Battrick, VK3OR, using VK3ZA's TX.
John was one of the party of Executive & VK3 Council members who manned VK3WIA/P Point Nepean, Vic.
Contact was made with all States, ACT & PNG. Operations were conducted on 160, 80, 40, 20 & 2 Metres.

QSP

As I write this, the John Moyle National Memorial Field Day has just closed—the generators have stopped and the atmosphere—audibly and RF wise—has quietened down once more.

My own estimate of portable station activity during the NFD was that the numbers semed to be lower than in previous years—others in our party at VK3WIA/P felt the same. Analysis of the logs will, in due course, tell whether we were right or wrong.

The more portable mobile stations on air the better, in terms of a good Field Day, and this was a good one; but I suppose a few more or less from year to year is of no consequence—Or is it?

Recent devastating floods in Queensland and New South Wales point-up the fact that tragedy can strike at any time and in many ways and a Field Day—even once a year—can be helpful because we take down our portable gear, dust it off and work in make-shift fashion as we may have to do in any emergency.

Radio amateurs can and do provide a valuable National asset for those charged with planning to cope with disasters.

Over the years, WICEN and individual amateurs have given communication assistance in numerous ways in most States.

Is WICEN dead? Need amateurs be concerned with the need to operate in emergencies? Two common questions, often heard in the light of the vast improvements in Police, Civil Defence, Fire Fighting and other authorities communication facilities.

Speaking with Colonel George Warfe, Director of Civil Defence in Victoria, he told me:

"Our HF, VHF and more recently UHF comms are excellent, as are those of many other Authorities in this State.

"WICEN not needed? Rubbish!

"Keeping in mind the role of WICEN in Victoria—to provide a back-up to PMG facilities—and the PMG are co-ordinators of communications in the State Disaster Plan—we are extremely lucky in this State that we have not needed to call on the facilities of WICEN.

"We are fully conscious of their value and their capacities and those of amateurs in general.

"The fact that amateurs have not been called upon is no reflection in any way—we've been extremely lucky".

By the time you read this, the Minister for Defence, will have presented to Cabinet a paper on the establishment of a National organisation to handle co-ordination of support for disasters.

The value of the Amateur Service and its 6000 members throughout Australia, is not unknown in either State or Australian Government circles and a letter has gone forward to the Minister for Defence re-iterating the capacity and willingness of Amateurs to be included in any ultimate National Plan.

Field days are a lot of fun and the name of the game is to get into the field, communicate and come back satisfied, weary and, hopefully, a little wiser.

Remember, too, that the NFD isn't restricted to field and mobile stations.

See you on the bands next time?

John McL. Bennett
VK3ZA

REMINDER

With EDP address labelling for AR now in operation the computer has been so programmed that address labels will not be printed for unfinancials at the time of printing labels for March AR (VK3, 6 and 7) or April AR (VK2, 4 and 5). The input data for these labels has to be finalised two weeks earlier. No missing issues can be sent out except against pre-payment of 70 cents per issue.

MARCONI COMMEMORATION

Marconi was born at Bologna on 25 April, 1874. During the month of April 1974 many meetings will take place at the Villa Griffone and the Marconi Foundation assigned to the amateurs the last weekend of March 1974.

The commemorative station I14FGM (Fondazione Guglielmo Marconi) will be particularly active from 29 March to the end of April. On 25 April, the station will be open for 24 hours and at 0815 GMT (hour of birth) a short commemorative message will be radiated by I14FGM to all amateurs.

A special commemorative QSL will confirm all the QSO's which take place on 25 April.

An international amateur meeting organised by the ARI branch section of Bologna will take place on 30 - 31 March, 1974.

Please address enquiries to:

Comitato Celebrazioni Marconiane,
Postbox 3113,
BOLOGNA 40100,
ITALY.

REPEATERS IN ITALY, ISRAEL and EUROPE

IARU Region I News of Dec. '73 observes that 2m FM in Italy in the past 3 years claims nearly 1000 users and mentions that 28 experimental repeaters await PTT licensing whilst others cover Southern Italy in part and almost the whole of the Northern areas. In Israel an FM repeater is expected to be activated shortly from the Jerusalem Mountains and the report quotes there are about 50 FM t W stations and 5 medium power CW/AM stations on 2m in this country. The list of 2m repeaters in Europe includes 2 in Czechoslovakia, 13 in Denmark well over 100 in West Germany, 1 in Holland, 21 in Sweden and 1 in Jordan with proposals for 34 in Norway and 9 in Belgium. Austria (6) and Switzerland (also 6) use 70 cm repeaters exclusively.

SYMPOSIUM ON SATELLITE COMMUNICATIONS FOR AUSTRALIA

A symposium on "Satellite Communications for Australia" will be held in Melbourne on May 27th-29th, 1974. Sponsored by the Radio Research Board the symposium is being organised by the Australian Post Office Research Laboratories.

Its objective is to bring together all those with a technical interest in the subject, at a time when Australia is investigating the use of a satellite communication system in the national telecommunication network.

There will be four sequential sessions, covering satellite communication systems, antennas, hardware, and propagation and digital techniques. Both review and research papers, from Universities, Institutes of Technology, Industry, and Government Departments will be included. Printed copies of all papers will be distributed to those attending. Two of the papers to be presented, in fact, are on the OSCAR programme.

Further details of the symposium, and registration forms can be obtained from:

Senior Assistant Director-General,
A.P.O. Research Laboratories,
59 Little Collins Street,
MELBOURNE, VIC, 3000

There is no charge for attending the symposium, but registration forms should be returned by April 30th, 1974.

WARC—MM TELECOMS

IARU Region 1 News for Dec. '73 contains a note which emphasises the continued need to exercise vigilance.

"The World Administrative Radio Conference for Maritime Mobile Telecommunications will open in Geneva on 22nd April, 1974. The IARU is an organisation invited to participate in the conferences of the ITU without incurring costs for attendance and services. The Region 1 Division will, on this occasion, undertake the representation of the IARU. SP5FM and G2BVN are expected to attend with OH5NW also to be present, if required.

It is not expected that the agenda of this conference will contain matters of importance to the amateur service but this cannot be taken for granted and it is essential that the representatives of the amateur service shall be alert."

UHF TVI—G-LAND

Ian Jackson G3OHX in an article in Radio Communication Dec. '73 writes—

"Sometimes it may be difficult to cure the TVI. Technically, a cure is always possible but there may be limits to which the TV set owner, dealer or manufacturer may feel obliged to go.

It must be realised that if transmissions then cause TVI continue, uncooperative neighbours are unlikely to become more understanding and they take steps (including legal action) to make you stop transmissions. It is preferable to ask the neighbour to complain officially to the Post Office, who will then support the amateur when his station is proved to be free from fault, and may be instrumental in bringing about a cure.

An RSGB member who is threatened with any action to restrict his transmissions is strongly advised to notify the RSGB Interference Committee."

FOXHUNTING CHAMPIONSHIPS

IARU Region 1 held their foxhunting championships on HF (80m) and VHF (2m) at Komlo 200km south of Budapest last August. "The equipment used in the contest included automatically controlled transmitters with a central control station and radio links from the control point to every fox. This was assisted by excellent organisation and contributed to a most successful event."

ENDING OF AR IN YA

"By order of the Minister of Communications of the Republic of Afghanistan on 18 August, 1973, all amateur radio activity in Afghanistan has been ended, and equipment used for that purpose sequestered by the Ministry." Members of the camel-drivers Club will be well aware of the situation.

VHF-UHF.

Dick, K2MGA in the Editorial to CQ Magazine for December '73 wrote "The lust for amateur v.h.f's and u.h.f's that we're now seeing is only the beginning of what is likely to come, and future attacks on these frequencies are going to be extremely difficult to repel, if they can be repelled at all. Unreasoned prophecies of doom? We don't think so. The fear for the future of the 10-160 metre bands which drew such attention in the '50's and '60's will seem tame by comparison to what's to come in the '70's . . . commercial services express no doubts whatsoever that amateurs could be usurped from the u.h.f's without the slightest bit of trouble!"

experiments in modulation and audio part one

J. A. Adcock, VK3ACA
P.O. Box 106, Preston, 3072

This is the first of four articles in a series. They are not construction articles but describe the novel techniques used by the author over recent years to process audio and to produce various types of modulation.

Some of the circuits discussed have problems which remain to be solved. Perhaps you have the answer. If not, your imagination still cannot fail to be titillated.

PREAMBLE

For many years I have been intrigued by the possibility of compressing the spectrum required by the human voice. About 5 years ago I thought of some methods of doing this but at the time I had no idea how to go about it. However, as time went on suitable analogue integrated circuits became readily available, and so my experiments were able to proceed. During the development of this idea a number of off-shoots became apparent. These are also described in the following articles. Many of these ideas I believe are entirely new. They could have been developed before, but I have no knowledge of them. If anyone knows of these systems being described elsewhere, I would be pleased to hear about it.

None of the systems have been fully developed, but they have all been tried out. Anyone attempting these experiments should have a thorough understanding of the wave forms to be expected in any part of the circuits. A CRO and a variable frequency sine wave generator are essential.

Details necessary to construct the units are not given in most cases, but if any interest is shown in the systems, I will be happy to provide more details.

All the necessary circuitry for the analogue elements may be obtained from the application sheets provided by the makers of the UA795 and the UA741.

A DOUBLE SIDEBAND SUPPRESSED CARRIER TRANSMITTER

(Stage 1, System 1)

This method uses a single ended class C final with high level plate and screen modulation. The block diagram of the system is shown in Fig 1, Fig 2A represents the wave form of the original audio and Fig 2B the envelope of an AM signal for comparison. Fig 2C is the RF envelope of a DSBSC signal. Note that between each zero crossing of the modulating wave there is a corresponding "pocket" of RF energy. At the instant of zero crossing of the audio waveform, the RF signal changes phase by 180°. This is indicated by the plus and minus signs in Fig 2C.

In this system the balanced modulator is hard limiting, and produces a wave form as shown in Fig 2E. This is the frequency component of the signal divorced from the amplitude component.

(Actually, in this circuit the limiting is produced by the grid action of the class C stage following the balanced modulator.—Technical Editor).

The relative phase excursions of the signal are shown in Fig 2F. The amplitude component of the DSBSC signal is that of a full wave recified pattern of the original audio shown in Fig 2D. When waveform 2E is amplitude modulated by waveform 2D, the resultant signal is a DSBSC as shown in Fig 2C. This system makes

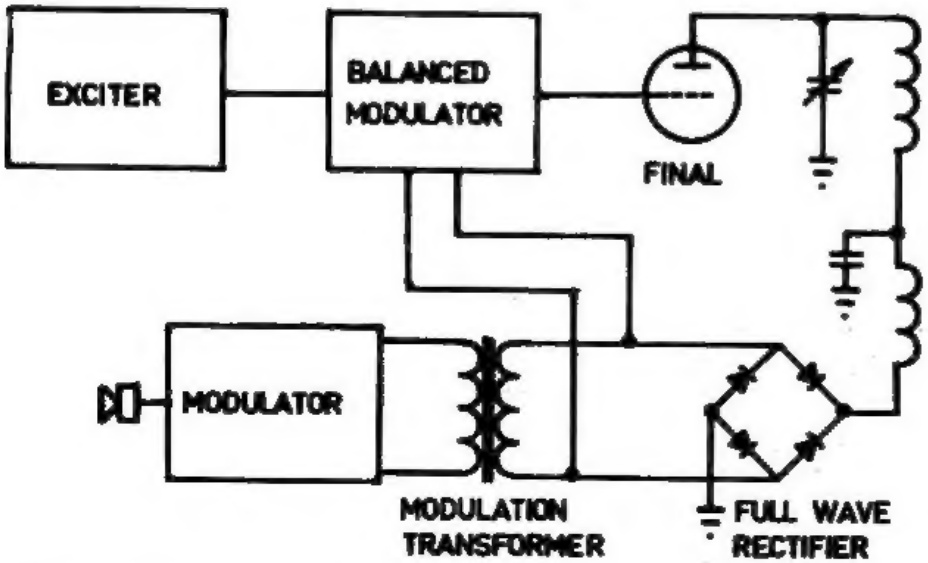


FIG 1 DSBSC TRANSMITTER

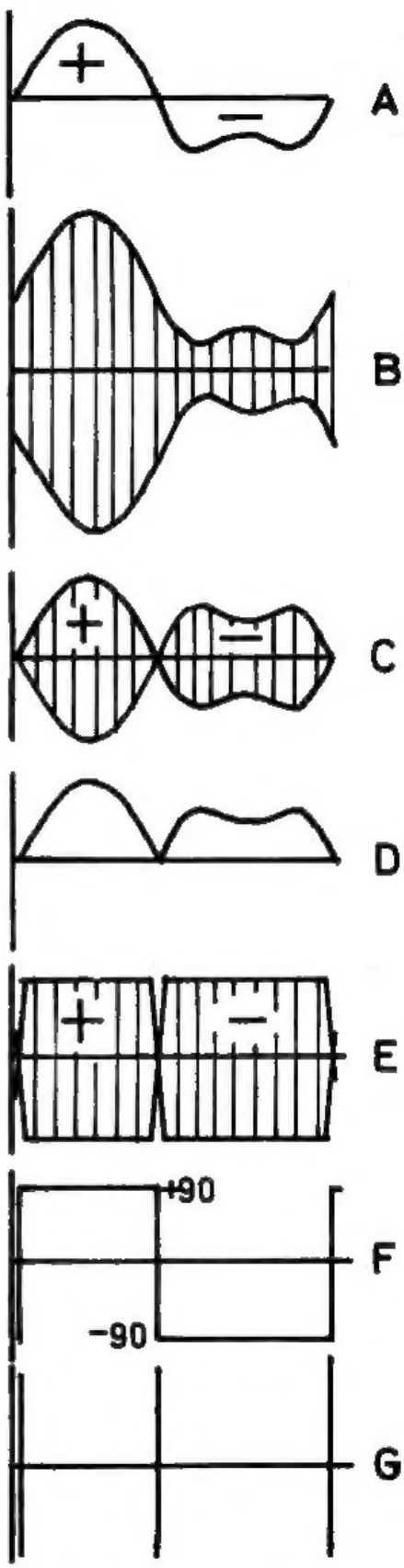


FIG 2 DSB WAVE FORMS

use of a concept in which the frequency component is separately modulated from the amplitude component. The same concept will be referred to again under system 4.

A suggested method of connecting the balanced modulator so that it is modulated with the same audio as the final is shown in Fig 3. The final could alternatively be screen modulated, although this results in a loss of efficiency.

The advantages claimed for this system over other high level modulation systems are:—

(1) Although it is a little more complicated than the final amplifier balanced modulation system, it makes better utilisation of the final tube. In the final balanced modulator method, two tubes must be used, and each is operating for only half the time.

(2) With this method a single ended final or a push-pull stage with a common screen can be used.

The system described has been tried out by the author and it is intended to make it a permanent adjunct to the 2 metre transmitter.

(A transmitting system similar to this was produced by at least one manufacturer prior to 1957. It is sometimes referred to as the Envelope Elimination and Restoration System.—Technical Editor)

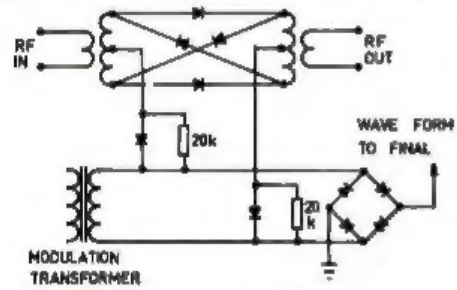


FIG 3 BALANCED MODULATOR

DOUBLE SIDE BAND SUPPRESSED CARRIER DETECTOR

(Stage 1, System 2)

Because this device was the first development in the current series of experiments, the main part of the circuit is shown in complete detail. Fig 4 shows the block diagram of the system.

Fig 2G is a graph of the frequency deviation curve of the DSBSC envelope of Fig 2C. Since the frequency of the signal does not show any deviation. At each reversal of phase, there is, in effect an infinite excursion of Frequency causing a pulse as shown in Fig 2G. The curve in Fig 2G is actually the differential coefficient of 2F. The diagram for Fig 4 shows the output from the AM detector equivalent to 2D, and the output from the FM discriminator equivalent to 2G. The pulses from the FM detector are amplified and made negative for triggering the flip-flop. The signal from the AM detector is fed into the phase splitter such that, with zero signal input, the output for both phases are of equal DC level; also the output from the AM detector must contain the DC component from the envelope. That is, the whole circuit must be DC coupled.

THIS IS MOST IMPORTANT!

The output from the flip-flop produced a curve equivalent to Fig 2F. The switch restores the wave from to that of Fig 2A by selecting each alternate half cycle from the phase splitter, switch, flip-flop and pulse amplifier is shown in Fig 5. This unit is here-after referred to as the wave form restorer.

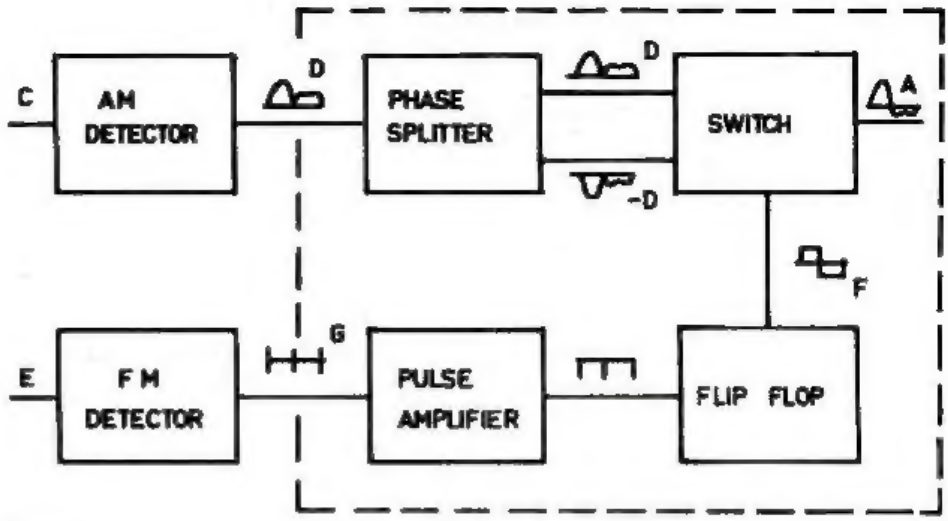


FIG 4 WAVE FORM RESTORER

The system differs from the carrier injected and phase locked system, in that all signal processing is carried out after detection—**no local oscillator is used.**

It is not claimed that this system is any better than the phase locked system. The author has not had time to analyse the signal to noise ratio performance, but it is suggested that it is the same as the carrier injected method. There may be some advantages in less circuit complexity. This system has been used in receiving DSB by the author.

(to be continued) ●

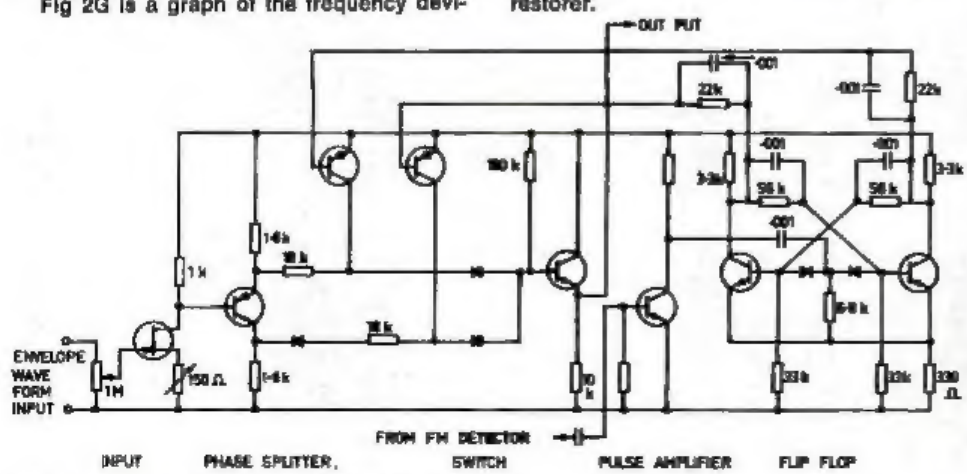


FIG 5 CIRCUIT OF WAVE FORM RESTORER

long delayed cosmic echoes – or galactic dx

Alan Shawsmith VK4SS

35 Whynot Street, West End, 4101

On the 15th Oct. '73, scientists in the city of Gorky, U.S.S.R. reported the reception of strange and unusual RF pulses from the direction of outer space. No frequencies were given but the signals were said to arrive at very regular intervals. The interpretation of this, is that they could be artificially produced from another civilization.

Reports such as these (there have been many before), stimulate curiosity in the still unsolved mystery of LDEs. Is there life beyond our solar system? Out in space, there exists a million, million stars in maybe a million, million galaxies. So, it is only natural to ask the question. Are we the result of a freak chemical accident and consequently, unique upon this tiny planet Earth? Or by the law of probability, does life exist on countless other stars? Opinion is now to the latter supposition. If this is so, why then have we not been contacted or visited before, because other civilizations, if they exist, may be far more advanced than our own crude society. The barrier that isolates us, even in our own galaxy, is that of space-time and is measured in some cases in thousands of light years. Also, our small planet suffers the added disadvantage, that we are located colloquially, 'out in the sticks'.

If we imagine the cluster of towns along the East coast of Australia as the denser planets of the Milky Way, then our little Earth would be somewhere 'back of Bourke'. With the lures of Sydney and the Gold Coast near at hand, galactic spacemen are not likely to put us on the visiting priority list. However, it is not entirely out of the question. It has also been pointed out that the first commonsense move by an intending space visitor, might be to despatch an unmanned probe to sound us out and look us over. Now a new theory has been put forward to show that such a probe could be the possible origin of Long Delayed 'Cosmic' Echoes. This eerie and uncanny phenomenon manifests itself by the echoing back of RF transmission, after a delay of anything between 3 - 30 seconds: 8 seconds being about average.

Try to imagine this situation yourself. You call CQ 20mx DX, 3 x 3: no reply: the band seems quiet: then, half a minute later, your 3 x 3 call begins coming back, loud and clear and IN YOUR OWN FIST. Is that enough to send you to the Bar for a 'stiffener'!!?

W6ADP describes his experience thus:- *"I was calling ON4AU on 28 and switched over to listen and heard, on my own frequency, 'ON4AU de W6ADP K' — was very weird and never will forget it. Signal sounded like it was coming a long way but was S6 or so."*

In the past, some researchers have said that LDEs could simply be a figment of imagination. This theory was never accepted, even though it is recognized that the paranoid personality is prone to hear non-existent sounds. The healthy mind too, can play tricks, when that person is in an acute state of fatigue or strain. It would be true to say that some reports of echoes received, have been due to mistaken identity or imagination.

Other theories are that LDEs are spurious signals generated in the Transmitter, or are signals naturally delayed and amplified in the atmosphere. Attempts are being made at this moment, to prove or disprove these theories.

The first cosmic echoes were logged in the European summer of 1927. On the 11th Oct 1928 (note this date in relation to the Russian report), a large number of echoes were received on 31.4 metres HF in Oslo, Norway, near noon, with delay times between 3 - 15 seconds (most about 8 seconds) . . . during the same night, 120 echoes were observed at Eindhoven . . . in 1930, echoes were reported in Indochina. In 1934, more than 70 echoes were observed between 30th May and 8th July."

Authentic amateur reports on these strange echoes commenced in 1932 and have continued in 1965, 1967 and 1968 and 1969, on many different HF bands.

W6QYT, of the Radio Science Laboratory at Stanford University USA, has said that an active amateur might expect to encounter echoes, on the law of averages, once per year. The research team at this lab say that the echoes are likely to be strong and not distorted (no Doppler effect). Anyone hearing this phenomenon, should log the time and make a careful description of the observed effect and post same to W6QYT. • W6QYT says that amateurs may hear the effect but not recognize it as a true echo, so listen carefully.

Mr. Duncan Lunan, Graduate in English & Philosophy. Student in Physics & Astronomy—and a successful writer. Author of MAN & THE STARS.

To return to the theory or a possible space probe from outer space. At a recent meeting of the British Interplanetary Society, a young Scottish graduate, Duncan Lunan, advanced a theory, so fantastic and exciting, that if it's true, "Star Trek", "Dr Who" and "Lost in Space" will seem like old-fashioned history, in comparison.

For Mr Lunan is sure that he has stumbled across proof that there is an unmanned spacecraft circling the moon and that it was sent up by the people of a dying star, Epsilon Bootis, 13000 years ago.

The very responsible British Interplanetary Society is so impressed with his documented hypothesis, that it is about to mount a major scientific experiment, to try to re-establish contact with the space probe.

A full explanation of Mr Lunan's hypothesis is not possible within the confines of this article but here are some of his comments:-

— while researching, I came across a record of experiment done by a group of scientists in 1927-29, about radio signals beamed out into space and a set of peculiar echoes which kept coming back. These echoes didn't repeat the original signals, but returned one of different length and at different intervals, like 3, 5 and up to 20 seconds. I reasoned that, if a space probe was trying to establish contact with us, the first thing they would probably do, would be to plot their position. This seemed the key to the puzzle that had stumped the experts for so long, so I plotted the signals in the shape of a graph. (This graph which clarifies Mr Lunan's remarks, can be had from the magazine *"SPACEFLIGHT"*, 12 Bessborough Gardens, London.)

He continues, *They formed an instantly recognisable stellar constellation, that of Bootis the herdsman, just to the left of the Plough. I translated all the other sets of signals into graphs and they show an enormous amount of detailed information, including by mathematical deduction, the star Epsilon Bootis. We know this star has been dying for years, because of expansion and overheating. So I think the inhabitants sent out a spacecraft to try and contact other planets to which they might travel, or who could help.*

Mr Lunan feels that if the radio experiments in the 1920's had continued, they would have resulted in a further series of messages from the probe.

That's what we're trying to pick up now. At this moment, highly sensitive and powerful equipment is being assembled in England to beam out a radio signal hoping to re-establish contact.

• or to **A. T. Lawton, C-o Golde, 13 Gastonbridge Rd, Shepparton, Middlesex, England.**

Sceptics of the above theory will point out that the problem of sending a probe as a means of communication is one of being able to attain sufficient interstellar speed. A successful launch could only be made from a twin star gravitational vortex. Epsilon Bootis is such a system.

The station now being set up in England will be known as GOLDE — Ground Observation of LDEs. The transmitter has a Moonbounce aerial set up, equatorially mounted. It will transmit 1kW on a 33 degree bandwidth, aiming at the equalateral points in the Moon's orbit. The fqs are in the 2 metre band (the reason for this choice of fq will be given later). The Main receiver is a product of EMI Limited; extremely sensitive and with a very sophisticated satellite tracking aerial, altazimuth mounted, 9 ½ degrees beamwidth with remote control. The timing mechanism of the eqpt is sensitive down to millions of a second.

Mr Duncan Lunan elaborates further —

Besides the question of the probe in space the GOLDE station hopes to settle the question of spurious signals generated in the transmitter and-or solve the mystery of delayed and amplified signals in the atmosphere. This is where overseas stations can play a part, particularly a set up in Australia. If we get a sufficiently long baseline to show by triangulation that the 'echoes' are coming from the Moon Equilateral points — then we're almost there.

Natural reflection, inside or outside the atmosphere, is ruled out by the recorded intensities of the 1920's signals. They were up to one-third the intensity of the outgoing pulse, after a 3 seconds' delay, and likewise on all other times noted up to 30 seconds. In other words, the inverse square law is totally defied, whether the echoes were being reflected round and round the Earth or from a string of objects in space spread at exactly one light second intervals. (UFOs — saucers, or what??) However many professional men refuse to accept this point — Sir Bernard Lovell has spoken with great finality. He considers the 'echoes' the result of multiple reflection around the Earth. There are others who consider the theory of evenly spaced 'natural' objects more plausible than a space probe. To disprove this it will be necessary to show that any received 'echoes' do not come from objects in the Moon Equilateral points. This is where the hyper-accurate timing will play its part at the main receiver, ***AT GOLDE STATION.***

Mr Lunan makes further comment. This time on the choice of fqs.

Two metres was chosen, simply because of the QRM situation on other bands. The original echo channels of 31.4 and 25 metres are now saturated with man-made interference from morse and telex stations. A programme, commenced after WW2, was a failure due to this and a team at Stanford in California encountered great difficulty. Another point is that the ionosphere is ordinarily capable of great interference at those wavelengths.

The 1920's echoes were heard ***ONLY*** *when the ionosphere was quiet, particularly in April and October.* (My log shows the bands were quiet on 15th Oct. '73 — the date pulses were received in USSR. — VK4SS)

The Stanford research team investigating naturally amplified and delayed 'echoes', produced by interaction between radio waves and physical plasma waves in the upper atmosphere, showed that these too were audible when the bands were quiet. But these 'echoes' are isolated, not in sequences and show both time compression and frequency shift. It's the ***absence*** *of the two latter conditions plus that of inverse-square-law diminution and the* ***substitution*** *of dashes in the 'echoes' for dots sent out, that convince many that the 1920's echoes could be artificial.*

Echoes of this apparent nature and characteristics ***do*** *still continue to this present day, over a great range of wavebands, but* ***not*** *now on the original channels where man-made QRM has reached a high level.*

No one until now has beamed signals straight at the Moon Equilateral points. This will be done by GOLDE station in England and it is hoped will help determine the origin of these types of echoes. There's reason, both in the signal patterns and in the dates and times of the 1920's results, to suppose that the probe itself may be in the leading equilateral point, with a relay unit in the trailing point. If the echoes are natural from atmospheric, it will not make any difference where the GOLDE aerials are pointing, but if they are coming from the equilateral points, then it should make a tremendous difference.

The theory that some of the LDEs are artificially produced and from an unmanned space probe is an exciting and romantic one, to say the least. If proof of the probe's existence can be established, then the burning question that has fevered the mind of star gazing Earthman — 'are we alone the only race or are there others out in space' — will have been answered.

Duncan Lunan expects both criticism and cynicism. He will get it. However, even if his hypothesis does seem, on the face of it, a long-shot theory, it is well to keep in mind that Earthmen are now in the embryo stage of planning and developing a space probe programme which may one day see unmanned vehicles journeying to parts of our galaxy, including Epsilon Bootis. ●

zener diodes from transistors

Rick Matthews VK5ZFQ

Reprinted from the South Australian Journal. June, 1972.

Nearly all the Zener diodes now available are made by exactly the same process as the base-emitter junctions of silicon planar transistors and some manufacturers have even been using below specification transistors for Zeners.

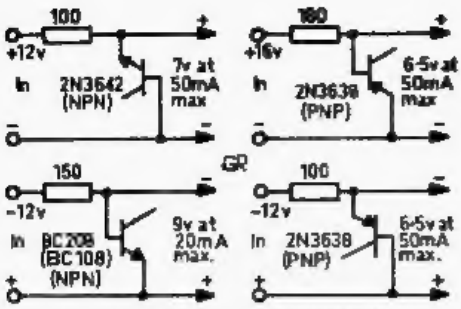
The table shows some of the transistors commonly available, listed with their average characteristics. If you wish to use other silicon planar transistors, then apply the manufacturers' rule of thumb and derate the maximum power dissipation to 2-3rd of the transistor's rated maximum. The minimum Zener current is usually set to about 5mA to ensure proper zenering.

The voltage range may seem a bit restricted but it is fortunately very close to the *zero temperature coefficient* region and is in the most popular range for voltage references. Of course, higher voltages can be obtained by using two or more Zeners in series, and you get good voltage temperature — stability yet still **PAY LESS** than for a normal Zener diode. Sometimes you can get an extra 0.5V by using the collector to emitter connection. However, some transistors (such as the 3N3642) exhibit *negative resistance* and will oscillate, so be careful.

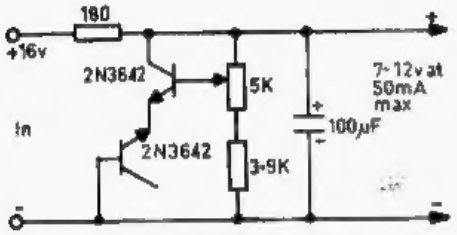
The dynamic resistance measures the quality of the Zener diode. The ideal Zener diode would have zero ohms dynamic resistance and would have the same voltage across it over its full current range. However, all Zener diodes act like ideal Zener diodes in series with a resistor equal to the dynamic resistance. From this aspect, you can see that the 2N3638 makes a very good Zener diode.

The circuits all show standard voltage regulators using transistor Zener diodes for voltage references. I have shown 12 and 16 volt inputs as they are commonly encountered in automotive and 12V AC rectified circuits. The first 4 circuits may be used to test the zener voltage of a transistor before using it elsewhere. The first 5 circuits are shunt regulators and are a bit wasteful in terms of power and limited in output voltage. The last three circuits, Nos. 6, 7 & 8 are series regulators which are more complex, but offer higher output currents.

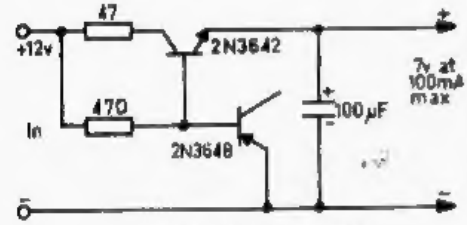
TRANSISTOR	ZENER VOLTAGE	DYNAMIC RESISTANCE	MAXIMUM CURRENT	MAXIMUM POWER DISSIPATION
BC208-BC108	9	20 ohms	22mA	200mW
2N3642	7	6 ohms	70mA	500mW
2N3693	7	12 ohms	30mA	200mW
2N3563	6.5	15 ohms	30mA	200mW
2N3638	6.5	2 ohms	75mA	500mW
2N706	6.5	5 ohms	30mA	200mW



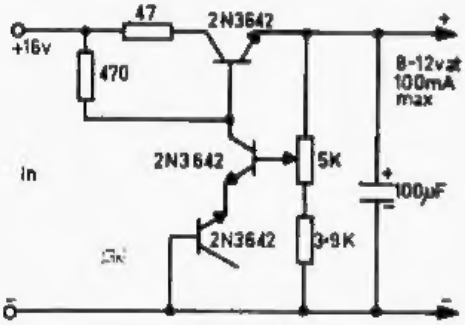
CIRCUITS 1 to 4 (SHUNT)



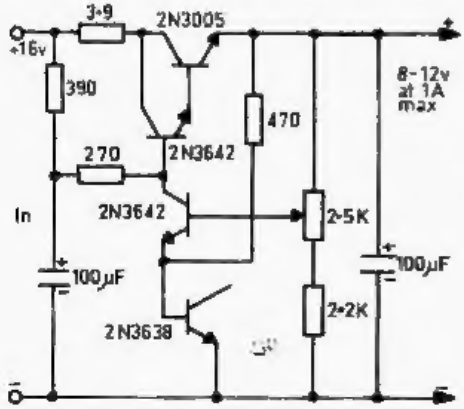
CIRCUIT 5 (SHUNT)



CIRCUIT 6 (SERIES)



CIRCUIT 7 (SERIES)



CIRCUIT 8 (SERIES)

2 metre RTTY Autostart

Ken Kelly VK4MJ
285 Monaco Street, Surfers Paradise, Qld., 4217

Interest in RTTY is increasing in VK4, and several operators on the Gold Coast are commencing regular traffic on 2 metres with stations in Brisbane. It was desired to run an auto-start net, so that messages could be sent in the absence of the receiving operator, who could in turn reply at a later time, possibly when the first operator had left his shack.

There is nothing new about the circuitry in this little unit, as it was taken direct from the manufacturer's data sheets. However it has been established that it works reliably, and is about the simplest system that can be devised to meet the purpose.

The unit consists of a NE567 phase locked loop IC, which is designed as a tone decoder, and is connected across the speaker voice coil leads of the VHF receiver. The PLL is tuned by means of a tab-pot to the desired frequency, in this case 2125Hz which is the RTTY mark tone, which closes a relay when this tone is received. When the tone is switched off, the relay drops out promptly. The relay contacts are used to turn on the mains supply to the RTTY machine and terminal unit, and this commences immediately to print any teletype message which may be sent. The band width of the decoder is sufficiently wide that it will not drop out when the space tone is received, as this is only 170Hz higher than the mark tone. However any speech which may come up on the channel is ignored by the decoder, and it does not operate.

The circuit diagram Fig 1 shows the connections for the IC. The pin numbers are the same for either the top hat or the V package, the latter being an 8 pin DIP. The centre frequency is given by the formula

$$F_o = \frac{1.0}{R1\ C1}$$

F_o in kHz
R1 in k ohms
C1 in uF

The optimum value for R1 is quoted as around 4000 ohms. Suitable values were found to be a 5K trim pot, and for C1 0.13mF. (0.1 and 0.033 in parallel). C2 is the low pass

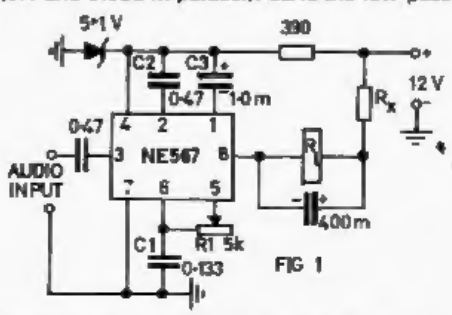


FIG 1

filter capacitor and a value of 0.47 mF was used. C3 was fixed at 1.0mF, and may be increased if objectionable false outputs are found just outside the capture range.

It should be noted that the voltage on the IC should be about 5 volts for its phase-lock portion, but that the output drive connection, pin 8, is rated at a little over 12 volts, and may be used up to 100mA. It will be necessary to find a relay which will work well at 12 volts and about 80mA. Such a relay will probably have a coil resistance of about 120 ohms. Rx in the diagram is used to limit the current somewhat, and with the relay used in the prototype, is a 40 ohm half watt value. Note that the 12 volt supply is reduced by a 5.1 volt zener diode through a 390 ohm resistor, for the phase-lock section of the IC.

ADJUSTMENT

Place a current meter in series with the 12 volt supply to the relay, and switch on. There should be no current flowing, or at the most about one mA.

Now apply a tone of 2125Hz to the input terminals. Probably some current will be registered on the meter. Adjust R1 for maximum reading. If the maximum appears to be going over 100mA, increase Rx until the maximum value obtainable by adjusting R1 is just under 100mA. If on the other hand you are not able to obtain enough current to operate the relay, Rx should be decreased, or even eliminated, provided that the current never exceeds 100mA. The relay chosen should of course be fitted with contacts which are suitably insulated for application of the 240 volt AC to be controlled, and also of sufficient contact area for the current to be used in the AC circuit.

Now check and ascertain that when the tone is changed to the space frequency, 2295Hz, that the relay still holds in. If it does not, retune R1 using a frequency of about 2160Hz and you will find that the problem will be solved.

For full information on the use of this IC as a tone decoder, the reader is referred to the Data sheet issued by Signetics, and also an article entitled "Need a tone decoder?" which appeared in "Electronic Design" October 14, 1971, page 66.

QSP

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Canada's first domestic communication's system is based on what is claimed to be the world's first synchronous domestic communications satellite launched in Nov. 1972. ANIK-1 carries 12 transponders each for one RF channel capable of handling one colour TV channel or up to 960 one-way voice channels in the frequency bands of 6GHz for the up-links and 4GHz for the down-links. *ITU Telecommunications Journal Jan. '73.*

Legislation.

The Australian national laws concerning the use of radio frequency spectrum are the Wireless Telegraphy Act and the Broadcasting and Television Act. The former is administered by the Postmaster-General; the latter by the Minister for the Media (Australian Broadcasting Control Board). The radio frequency spectrum management is in the hands of the International Frequency Registration Board (IFRB) which is an organ of the International Telecommunication Union (I.T.U.). Australia is a member of the I.T.U. and of its governing body and representation is through the Department APO News Nov. '73.

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modifying the Vinten MTR 13 for 2 metres

D. M. Rosenfield VK3ADM

5 Lygon Street South Caulfield 3162

In recent years a number of MTR13 units have become available, to amateurs in VK3 especially This article should enable anyone purchasing one of these units to modify it for operation on 2 metres.

GENERAL DESCRIPTION

The Vinten MTR13 comprises a complete FM transmitter, receiver, and power supply on one chassis. It is designed to be used in the 166 – 174 MHz band at 60 kHz channel spacing Individual metering sockets are incorporated for performance checking.

POWER SUPPLY

The power supply consists of 2 germanium power transistors in a push-pull DC current switching circuit, in association with a toroidal power transformer. HT is rectified by 4 diodes in a full wave bridge. A fixed bias voltage is obtained from a separate winding which uses one diode as a half wave rectifier

The unit is designed to work from either a 6, 12 or 24 volt DC supply negative or positive earth system.

Current Drain, 12 volts.
Receive — 2.4 Amps.
Stand by — 4.5 Amps
Transmit — 7 Amps

Voltages.

Major HT		300v at 80 mA
Minor HT		150v at 50 mA
Bias	–25v &	8v DC at 5 mA

WARNING. Before applying any power to the unit, check voltage and polarity.

TRANSMITTER. Frequencies listed below are for 146.0 MHz chan. B

The transmitter employs 10 separate stages, consisting of a crystal oscillator V13, 4055.5 kHz Phase modulator V14, Buffer V15 4055.5 kHz 1st Doubler V16 8111.0.0 kHz 1st Tripler V17 24333.0 kHz 2nd Tripler V18 72999.0 kHz 2nd Doubler V19 146.0 MHz PA V20 146.0 MHz. Microphone Amplifier V21 and limiter amplifier V22

The microphone used is a 2K ohm rocking armature type

TRANSMITTER CRYSTAL SPECIFICATION

Frequency crystal = $\frac{\text{Freq carrier}}{36}$

Style D, .002 percent, 0 degrees to + 60 degrees C, 30pf

MODIFYING AND TUNING THE TRANSMITTER

Step 1 Remove the RFC from the centre tap of the original tank coil L11 and remove the tank coil from the PA tuning capacitor C121. Wind 4 turns of 16 gauge tinned copper wire, on a ⅜" diameter former, with a ⅜" space in the centre Leave ¾" leads at each end of the coil. Overall length of the PA tank coil should be 1" with ⅛" spacing between the turns refer Fig 1.

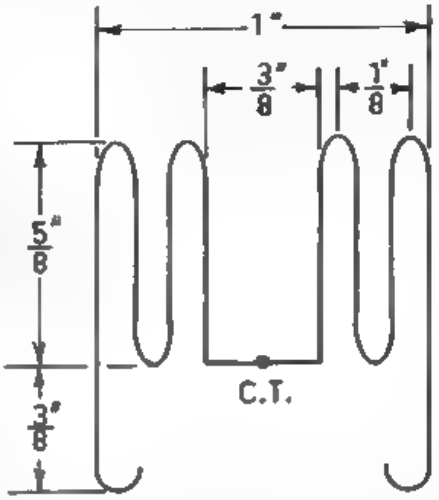


FIG 1 CONSTRUCTION OF P.A. COIL

Bend the ends of the coil leads around C121 which should leave ⅛" straight lead to the coil. Resolder the coil to C121 and solder the RFC to the centre tap

Step 2. Fit a 6.8 pf 300V disc ceramic capacitor across the primary of V18 plate coil (pins 1 & 2 on transformer 164)

This completes the modifications to the transmitter, all that is required now is to realign every stage.

WARNING. The PA tank coil L11 has 300 volts applied at all times, even in the receive condition.

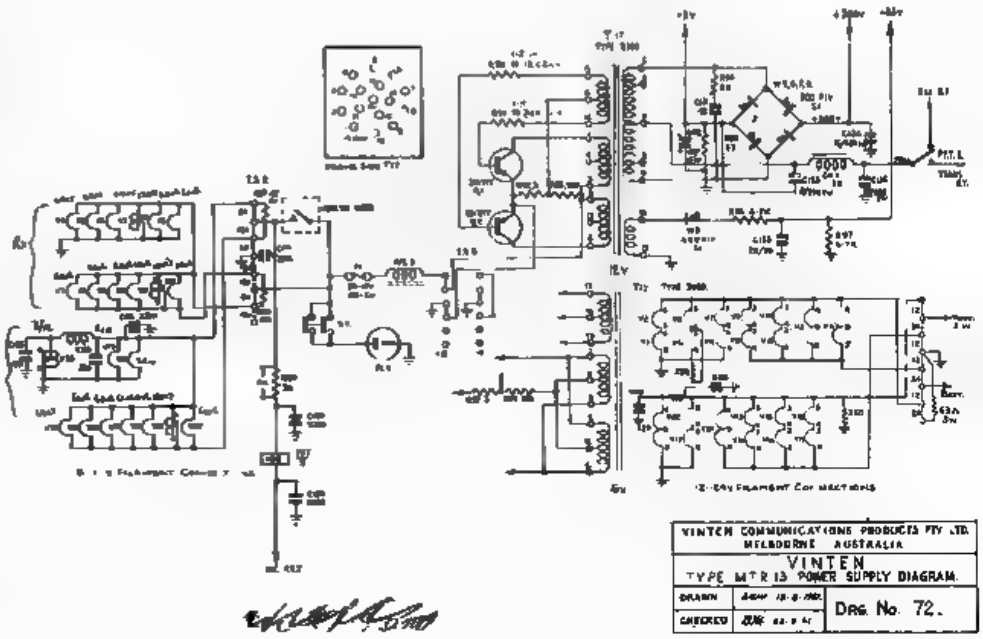
ALL TEST SOCKET READINGS ARE GIVEN FOR A 1000 OHMS PER VOLT METER

Switch on the unit, allow normal warm up, plug your 2 metre crystal into socket XL2

All Vinten transformers have a locking ring on top of the slug which requires a special tool to loosen and align the slug They can possibly be purchased from Plessey Electronics but a screwdriver can be used with care

Place a 0-1 mA meter in test socket TP6, loosen locking rings on top and bottom of the 162 transformer depress P.T.T. button, screw top slug into the coil till a maximum reading is obtained. Then screw the bottom slug into the coil till a maximum reading is obtained, lock the bottom slug and then give the top slug a final adjustment for maximum reading, making sure that the slugs do not move when locked When the No 162 transformer is tuned the meter should read approx 400 uA at TP6. If any test point readings are more than 25 per cent lower than those stated, change the valve and retune the stage in question.

Plug the meter in test socket TP7 screw in the top and bottom slugs on transformer 166 and peak them to give a reading of approx. 1.2mA, lock both slugs and plug the meter in TP8 and realign transformer 163 in the same way to give a reading of approx. 1.8 mA and lock both slugs. Plug the meter in TP9 and realign the top slug in transformer No. 164 (there is no bottom slug) for a reading of 2–3 mA, lock the top slug. Plug the meter in TP10 and adjust C118 and C119 to peak at approx 2–3 mA. It may be necessary to "squeeze up" L9 and L10 in some sets if they don't quite make frequency. Plug a 50 ohm non inductive dummy load into the antenna socket, and plug a meter in TP11, tune C121 (PA tank condenser) for a dip at approx 60



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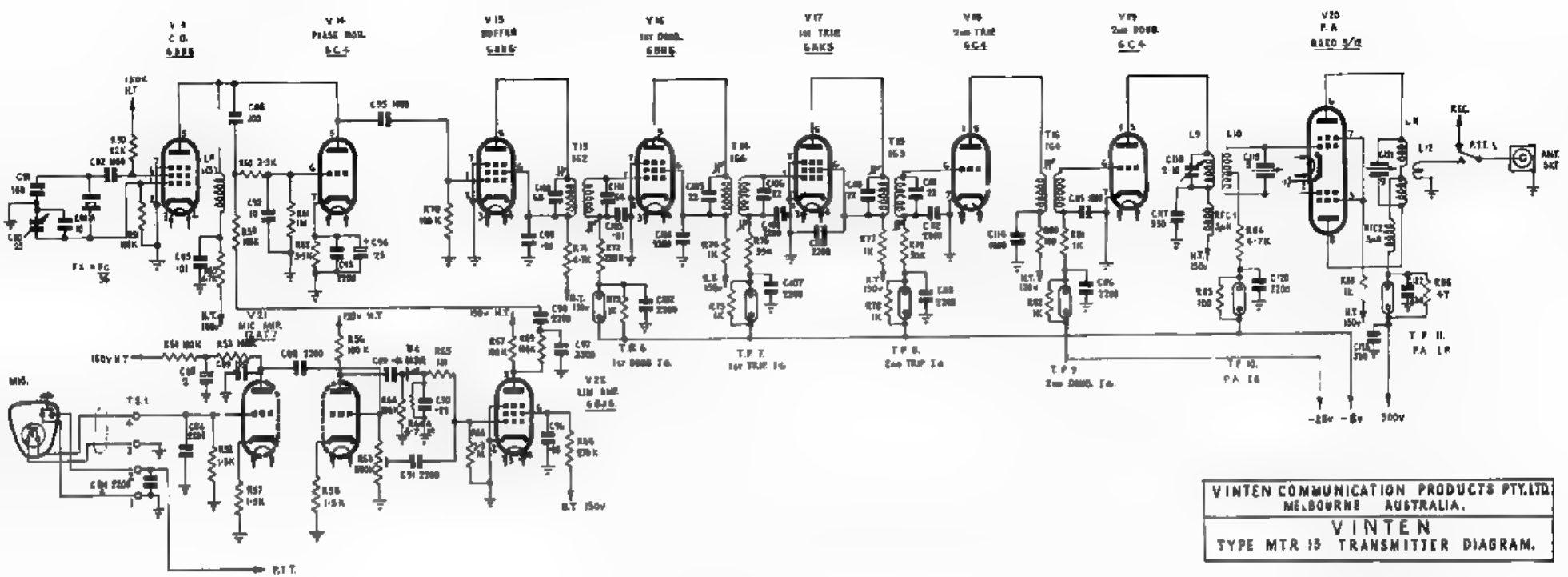
VINTEN TYPE MTR 13 POWER SUPPLY DIAGRAM.		
DRAWN		DRG. No. 72.
CHECKED		



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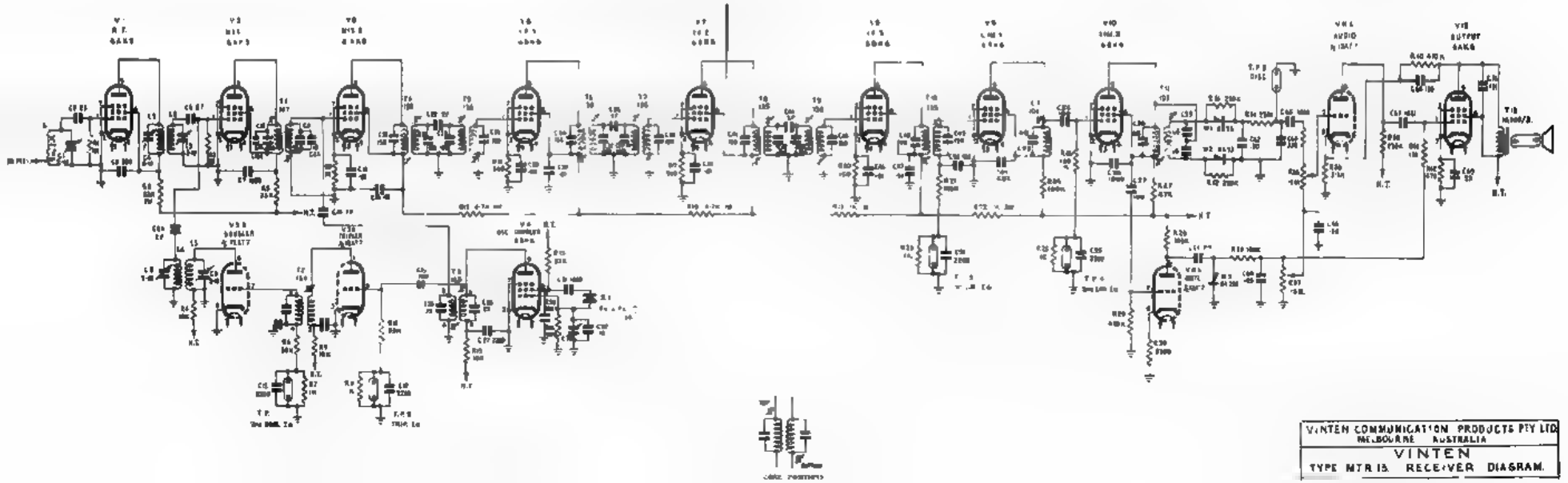
VINTEN

TYPE MTR 15 TRANSMITTER DIAGRAM.



VINTEN COMMUNICATION PRODUCTS PTY LTD.
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VINTEN

TYPE MTR 15 RECEIVER DIAGRAM.

mA — 70 mA, the power output should be 10 — 13 watts.

To alter the crystal frequency adjust the trimmer C80 in the carrier oscillator V13. Frequency checks can be made with the P.M.G. monitoring station or another amateur station with frequency monitoring facilities.

When setting the deviation level remove the mic. input lead from the terminal strip on the chassis, couple a deviation monitor to the PA tube, connect an audio generator set at 1kHz into 600 ohm at —35dB into the mic. input terminals on the chassis, and adjust R63 in the grid of V21B for approx 13 kHz peak deviation. If the necessary equipment is not available an on-air check with another station is the only simple way out.

MTR13 RECEIVEP

The receiver is a double conversion 12 valve superhet using a single crystal for both converter frequencies. (Frequencies listed below are for approx. 146.0 MHz.)

V1. R.F amplifier 146.0 MHz V2. 1st mixer, input frequencies, 146.0 MHz & 123.5 MHz output frequency 22.5 MHz. V3B Doubler. Input frequency 61.7 MHz output frequency 123.5 MHz V3A. Tripler, input frequency 20.6 MHz output frequency 61.7 MHz V4. oscillator-doubler. input frequency 10285.7 kHz output frequency 20.6 MHz.

V5. 2nd mixer. input frequency 22.5 MHz output frequency 2MHz.

The I.F. amplifiers V6, V7, V8 are all tuned to 2MHz while the limiters, V9 & V10 are on 4MHz.

V11A is the first audio amp. & V12 is the audio output amp, leaving V11B as the mute or squelch amplifier.

Detection is accomplished by the 2 diodes W1 and W2 in conjunction with T11 in a Foster-Seeley discriminator circuit. Audio frequency output is approximately 1 watt.

RECEIVER CRYSTAL FORMULA:-

$$\text{Frequency Crystal} = \frac{\text{Frequency Carrier} - 2}{14}$$

Style D, .002 per cent, 0 to + 60 degrees C. 30pf.

MODIFYING THE MTR13 RECEIVER

STEP 1. Remove C10 and C11A pf capacitors from the base of the 167 transformer and replace with 20 pf.

STEP 2. Fit a 4.7 pf between pins 1 & 3 of the No. 7 transformer

STEP 3. fit a 10 pf capacitor between pins 1 & 2 of the 164 transformer. *All capacitors are 300VW disc ceramic.*

This completes the receiver mods now to the realignment:-

Plug in the 2 metre receiver crystal in socket X1, plug an 0—1mA meter in test socket TP2, loosen locking ring and adjust top slug on trans. No. 165 to peak at approx. 500-600 uA and re-tighten ring.

Loosen locking ring on the bottom slug and realign for a dip in the meter reading, lock the slug at the minimum reading

Plug the meter in TP1 and adjust the single slug at the top of transformer 164 to peak at approx 300 — 400µA, relock the ring.

Screw all the front end Philips type trimmers about ½ way in, plug a 0-1mA metre in TP3 and plug a 50 uA—0—50µA meter with a 100k resistor in series with one lead into TP5.

The next step is to feed a signal on the carrier frequency into the aerial socket and peak the Receiver front end trimmers,and the top and bottom slugs of T1 for a maximum reading on the limiter meter TP3. When aligning the receiver by the limiter meter, feed just enough signal in to give a reading of 300 µA which is approx. half saturation. If a VHF type signal generator is not available there is a very handy device in "AR" December 1970 by Ron Higginbotham VK3RN for aligning carphone receivers.

Provided the mods have been carried out properly and the IF is aligned on 2MHz and the valves in the receiver have reasonable emission, a signal of approx .3µV will open the mute, and a quieting ratio of 22dB for 1µV is not difficult to obtain.

2MHz IF ALIGNMENT

Realigning of the 2MHz IF channel should only be undertaken if it is suspected that previous misalignment has occurred, or if the locking rings have loosened.

Critically coupled transformers are employed which must be individually loaded when being aligned to achieve the symmetrical narrow band response desired.

Procedure

Equipment Required. A 2 MHz (preferably crystal locked) signal generator with variable attenuator and low leakage.

Plug the 0—1mA meter into TP3 and connect the sig gen between pin 1 of V8 and earth. Connect a 10K ohm damping resistor mounted on small alligator clips between terminals 1 & 2 of T10. Unlock top and bottom cores of T10 and tune for Maximum, adjusting the output of the sig gen to avoid Saturation. Repeat this procedure through V7, V6 and V5 connecting the damping resistor across terminals 1 & 2 of each transformer as it is aligned, and re-locking the cores immediately after individual transformer alignment. Ensure that the cores are tuned to the first maximum peak from the outer ends of the formers.

Sensitivity readings at 2MHz:-

Stage	Signal Level	Meter Reading TP3
V5	1mV	80µA
V6	1mV	200µA
V7	10mV	180µA
V8	100mV	70uA

The first limiter (TP3) current will vary with different valves and supply voltage. Little effect on performance will be experienced if the readings are 20 per cent below those listed.

2nd LIMITER ALIGNMENT

The 2nd limiter is tuned to 4MHz and may be aligned when the 2MHz alignment is completed.

Plug a 0—1mA meter into TP4. Reduce input at 2MHz to V4 so that the stage does not saturate and adjust L7 104 for maximum. Approx sensitivity for 100 µV into V4 gives 100 — 150µA in TP4. The linear operating section is very short at this stage and is intended to saturate on small signal inputs.

Discriminator alignment

The discriminator stage may be adjusted after the 2MHz IF and 2nd limiter stages are adjusted

Apply 1mV at 2MHz to V5 and adjust the secondary **TOP CORE** of T11 103 with a 50µA —0—50µA meter in TP5 until the meter deflects to one side. Adjust the primary **BOTTOM CORE** for maximum deflection Tune secondary through zero until the meter deflects to a maximum on the other side. Note the two readings and if unequal adjust the primary until they are equal.

Finally lock the primary core and adjust the secondary for zero DC output on meter and lock. Remove the 2MHz signal and observe the discriminator meter, it should not deflect more than 4uA approx. from the zero reading.

If the deflection is more than 4µA with no signal input then the IF may possibly be off frequency. Repeat complete alignment procedure until the desired results are obtained. ●

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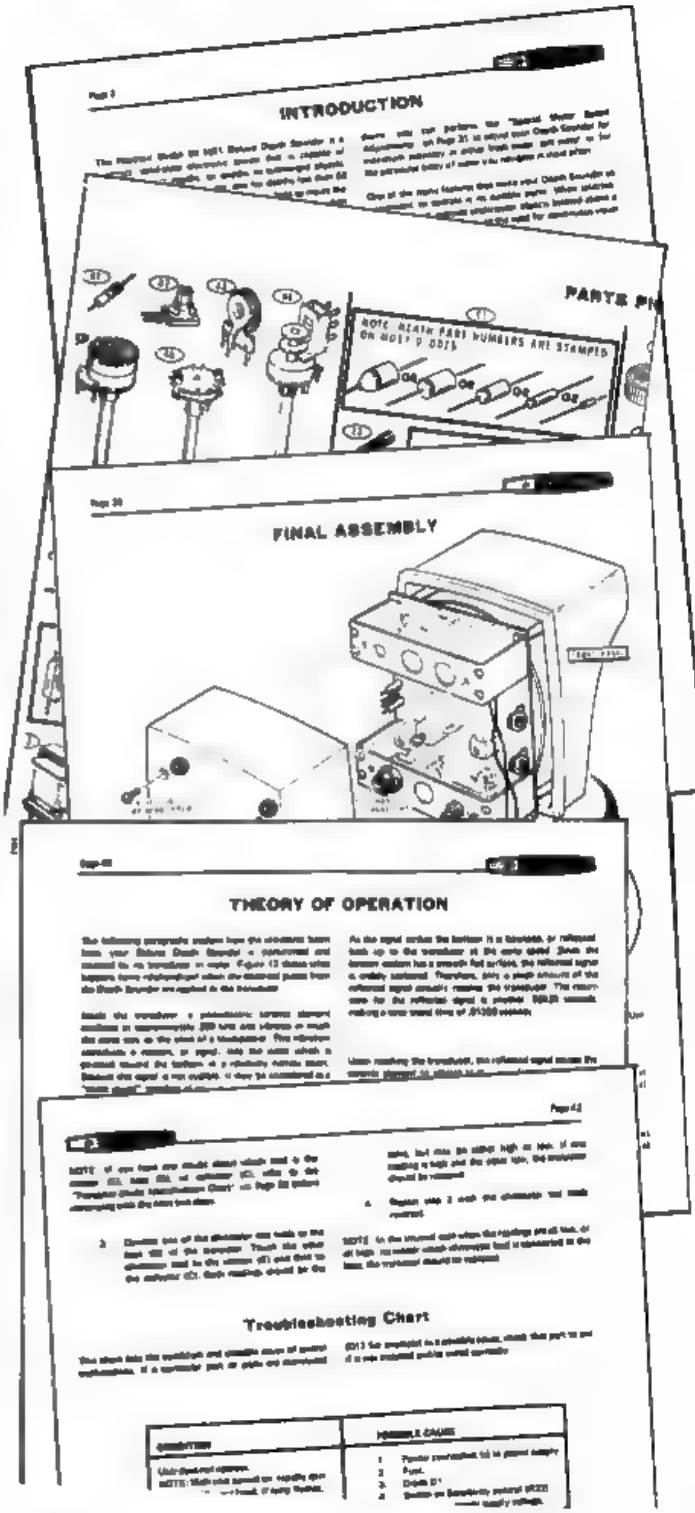

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FT101 Modifications

PHIL ZEID, 9M2CP
2a Biggs Road,
Penang, Malaysia.

FT 101 owners have experienced varying degrees of interference from spurious signals. These are primarily the result of intermodulation products present when high gain antenna systems are used under good conditions of propagation. The problem varies with location and with proximity to strong local transmitters on frequencies in and outside the amateur bands. It also varies with the band in use. Sometimes it is so severe that it is not recognised. For example, in this area many listeners to 7MHz consider the band unusable evenings and nights because of the high level of hash *S7 to S9*. In many cases this hash is the result of severe intermodulation and distortion products!

On other bands, notably 14MHz, the spurious signals sometimes show up as jingle bells, or so called teletype, or regions of heterodyne interference and hash.

Such problems are to a certain extent universal. Perhaps because the FT101 is such a sensitive receiver and so widely used its performance in this respect has been widely publicised

There is no way of getting something for nothing. To obtain optimum performance costs money and lots of it. In the most expensive and well designed receivers a compromise is made on front-end sensitivity and noise factor After all, under good propagation conditions on the HF bands a 2 to 3 dB noise factor is, in most cases, of no value.

With the above in mind the following modifications to the FT101 are suggested They may be applicable to other receivers. Each modification is based on sound design precepts and if all are carried out should result in a receiver with as good reception characteristics as you could wish for, within the limits imposed by the general basic design. In addition flexibility of control is built-in and will enable operating levels to be set to optimum under almost any of the variable adverse conditions likely to be experienced by the individual operator

Good strong adjacent signal handling capabilities can be built into a receiver by paying attention to 4 main design points. Each point is considered separately and it is shown how each may be incorporated into the FT101.

1. Use as linear a device as is practicable in the RF and mixer stages.

The choice of suitable devices here, is limited in practice, by the available over all gain of the set and also costs

Most of the trouble has been determined as originating in the second receiver mixer and to a much lesser extent in the first RF, in the writer's set (serial No. 20049) A compromise choice is to replace the second and, for another good reason, the first RF FET's with an RCA 40673. The former may be mounted under the mixer P.C. board after removing the original. Remember if this is done then the pin numbering underneath is reversed. The other advantage of using these FET's is that they have built-in diode protection.

These changes have been carried out by many with varying degrees of success. So if you do not like playing around in sets and changing FET's do not bother with this modification but leave it till last in case it proves unnecessary.

2. Provide a variable attenuator so that only the minimum required attenuation at the input can be applied.

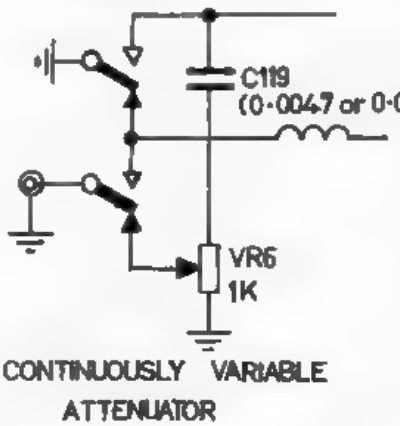
It would be most advantageous to have such a control on the front panel. You may put one there if you wish but remember to shield the leads to prevent damaging RF pick-up when on transmit. This requires cutting a hole in the front panel.

An alternative method (the one used at 9M2CP) is to use the so called "power output" pot, VR6, which has a control projecting out of the rear of the receiver. This is in an awkward position but the results from its use fully justify any inconvenience experienced. In actual fact it is not used too frequently

Obtain a small skeleton pre-set pot of 1 K ohm and solder one of the outer legs to the chassis in the vicinity of VR6. This is to become a substitute for VR6 Unsolder the two lead wires from VR6 and replace them in their **corresponding** position on the small pre-set pot. Tune up and adjust for required sensitivity of reading with the meter switch to P.O.

VR6 is now free to be used as the variable attenuator. If necessary loosen and rotate it so that its terminals are facing the antenna relay. You may have to flatten the locking pin to do this.

DIAGRAM A



CONTINUOUSLY VARIABLE ATTENUATOR

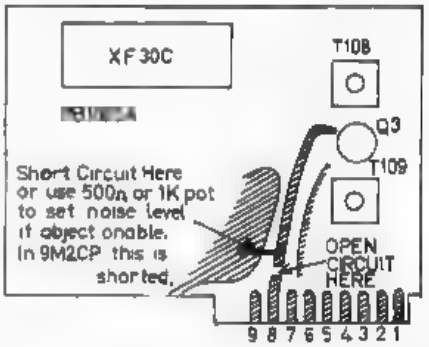
Now remove the one end of C119 (4700pF) and R48 (220 ohms) from the common antenna relay pin. In the writer's set this pin is at the far left hand side of the relay when the set is upside down with the front nearest to you. R48 is not used and may be removed. Preferably replace C119 with a 1000 pF, 200V working condenser. It is not essential however. Join the free end of C119 to the nearest outer connection on VR6 Earth the other outer connection of VR6 to chassis. Connect the empty antenna relay pin to the centre arm of the pot and the job is done The circuit will now be as in Diagram A.

This control will allow you to knock out spurii without undue loss of signal or sensitivity yet return the set to original condition if required.

3. Utilise maximum front-end selectivity available

Tune up the receiver circuits so that they peak at the same spot as the transmitter circuit. This is important. If it is not done you will not obtain maximum selectivity and unwanted-signal-rejection of which the set is capable. This may be the cause of the variable performance reported by some

DIAGRAM B SEPARATING RF GAIN CONTROL FROM IF



4. Use only the gain required for good signal-to-noise ratio in the RF stage and rely on maximum gain after these stages

Inspection of the circuit diagram will show that the RF gain control also controls the IC and Transistor on the IF module PB 1080A. The IF can be isolated from this control and run at full gain by open circuiting the thin copper strip that runs out at pin 8 and joining it to earth (the copper laminate) on the IC side of the break. If, in some receivers, this leaves you with too much noise and an objectionable receiver hiss you can replace the short with a by-passed skeleton pot of 1Kohm and pre-set it to the desired level At 9M2CP a short is used. Diagram B shows the final circuit. This arrangement allows independent gain control of the RF stage as distinct from incoming signal attenuation. This flexibility can be most useful under varying local adverse conditions

These modifications have resulted in a receiver which is as good a performer as one could desire. All controls are smooth in operation and effective in reducing any spurious signals. The audio quality has improved and background noise is reduced Full sensitivity can be obtained whenever conditions allow its use.

I am most pleased with these modifications and hope they will prove effective in overcoming the problems experienced at various individual locations. ●

Ferguson Low Height Power Transformers

A review by the AR technical staff

This review is based on a series of tests on two transformers, types PF3759 and PF3760 supplied by the Manufacturer. The transformers in this series will be of interest to the amateur requiring a power supply for solid state equipment.

They are designed for connecting to 240 volts 50Hz, single phase supply and are nominally rated 40VA. Dimensionally they are identical, with height limited to 1½", width 2⅜", length 4 5/16", and mounting centres 23/32" by 3 27/32".

General purpose Transformers types PF3759 and PF3760 are provided with two identical secondary windings with a tap on each. This permits series or parallel operation.

Series Connections: Eight values of voltage from each Transformer may be obtained by adding windings, using part of windings, adding windings to part of windings or adding part of windings to part of windings. With the use of these series connections the maximum continuous current is limited by the value listed under the heading "40 volt-amperes"

Parallel Connections: Three values of Voltage may be obtained from each Transformer at a current value of twice that listed under the heading, "40VA" by paralleling the windings in part or in full.

The special purpose Transformer, type PF3761, is designed for use with intergrated circuit regulators and other semiconductor components. The 15 volts windings may be series or parallel connected as required.

Each Transformer is fitted with round pin terminations and supplied with a set of six leads and a link with shrouded recepticles. These Transformers comply with the requirements of Australian Standard C126, where applicable, with respect to insulation and winding construction.

When tested all voltages were found to be a little lower than the nominal. None were more than 7% below the values quoted in the tabulation.

The two 15V windings of the PF3759 were connected in series and a load drawing 1.35A connected for regulation and temperature rise tests. For the PF3760 the two 25V windings were connected in parallel and loaded to 1.6A. The regulation was found to be satisfactory for both units although the load voltages fell away fairly quickly when the load was increased much beyond the rated figure.

The transformers were allowed to run at rated current. After 15 minutes they were too hot to hold in the hand. The air temperatnre at the time was 26 degrees C. In most situations under which they are likely to be used, they would have the advantage of connection to a good heatsink in the form of a chassis. For these tests the transformers were lying on a wooden bench with no special provisions for cooling. After several hours of continuous running at full load the temperature appeared to have risen no further. A check on the resistance of the windings followed by a few sums indicated that the "hot spot" temperature was about 80 degrees C. This is satisfatcory for the type E insudation used and means that the transformer will operate safely at full load in ambient temperatures up to 40° C.

Some constructors will appreciate the convenience afforded by the pin and socket connections. The low profile of these transformers is also an obvious advantage. The variety of voltage available at quite reasonable currents, coupled with a price of around $8.00 including sales tax, makes these transformers a very attractive proposition. ●

The tabulation sets out against type numbers the nominal rating and the voltage obtained at various loads when windings are connected in series, 240 volts being applied to the primary winding.

TYPE NO.	NOMINAL RATING	NO LOAD	10VA	20VA	30VA	40VA	50VA*
General Purpose							
PF3752	0-6V-7.5 at 20VA	18.3V	17.7V	16.8V	16.0V	15.0V	13.9V
	0-6V-7.5 at 20VA	(nil)	(0.56A)	(1.19A)	(1.88A)	(2.67A)	(3.60A)
PF3759	0-12V-15V at 20VA	36.2	34.7V	33.0V	31.0V	29.0V	26.7V
	0-12V-15V at 20VA	(nil)	(0.29A)	(0.61A)	(0.97A)	(1.38A)	(1.87A)
PF3760	0-20V-25V at 20VA	61.2	58.8V	56.0V	53.2V	50.2V	46.0V
	0-20V-25V at 20VA	(nil)	(0.17A)	(0.36A)	(0.56A)	(0.80A)	(1.04A)

All windings in series. Approximate current in amps shown in brackets.

*** Intermittent rating only**

Special Purpose		
PF3761		
	0.15 at 7.5VA	**(0.50A)**
	0-15V at 7.5VA	**(0.50A)**
	0. 8V at 27VA	**(3.00A)**

NO LOAD VALUE 10·9V

Awards Column

with BRIAN AUSTIN VK5CA
P.O. Box 7A, Crafers, SA, 5152

DX Listener's Century Award

1. This award is available to shortwave listeners.
2. Confirmations dated from November 1945 are valid.
3. Applicants should submit a list, certified by the Awards Manager, to Mr C. R. Emery, G5GH, "Westbury End", Finmere, Buckinghamshire, England
4. The fee, which must accompany the application, is 35p or 8 IRC.

Requirements. Confirmations are required from 100 of the countries listed in the RSGB Countries List. Stickers are available for each additional 25 countries.

Countries List: The RSGB Countries List is used for this award.

R-6-K Award

1. This award is available to licensed amateurs and shortwave listeners (on a "heard" basis)
2. Contacts on and after 7th May 1962 are valid.
3. QSL cards must be submitted to the sponsor along with a list giving full details of the contacts.
4. The award is issued in three classes:
   First class for ALL contacts on 3.5MHz
   Second class for contacts on any bands
   Third class for contacts on any bands
5. The fee for the award is 1 Rouble or 14 IRC, which covers return postage on the cards.
6. The address for applications is: Central Radio Club, Box 88, Moscow, USSR

Requirements: One contact with each of Europe, Africa, Asia, North America, South America and Oceania plus three contacts with the European part of USSR and three contacts with the Asiatic part of USSR — a total of 12 contacts

Alterations to DXCC List

Announcement is hereby made of one deletion and two additions to the ARRL countries list. The deletion is the present listing of Germany. The additions are the Federal Republic of Germany and the German Democratic Republic.

DXCC credits for the two new listings may be claimed for contacts made with these countries on or after 18th September 1973. Contacts made with stations therein before 18th September 1973 will be creditable toward the German listing only. Contacts made 18th September 1973 and after with stations located in West Berlin will be credited toward the Federal Republic of Germany listing. Stations located in East Berlin will be credited toward the German Democratic Republic listing. ●

REPAIR AND MAINTENANCE

"There are not too many shops in the U.S. or overseas which specialise in the repair of amateur radio equipment" writes W6QLV in Q. and A. for CQ Magazine December 1973. "The component that fails most often is still the vacuum tube followed by diodes, resistors, capacitors, relays, transistors, I C's, power transformers, pots, slide switches, etc., in that order. Before an amateur ships his set out for service he should check for the simple causes of trouble first. I maintain that the active amateur should be able to shoot his own trouble in the equipment he uses." ●

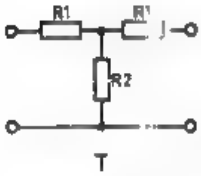
attenuator networks

C. A. Cullinan VK3AXU

6 Adrian Street, Colac, Vic., 3250

The author provides a comprehensive table giving design details for seven different attentuator network configurations. Applications of these attenuators include impedance matching, interstage isolation, gain measurement and gain reduction.

At times it is necessary to insert into a circuit a number of resistances to introduce a definite number of dB. loss. These resistances may be connected in various ways and are known as attenuator networks. (They are frequently referred to as "pads" or simply attenuators.)



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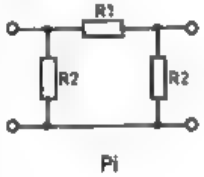
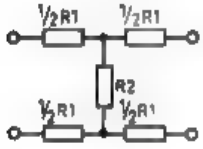


Pi



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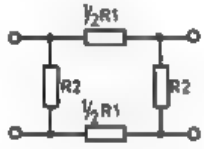
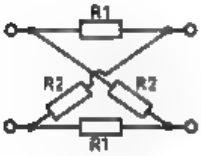
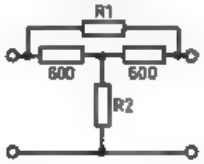


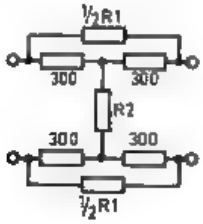
balanced Pi types



Lattice



Bridged T



balanced Bridged T

Sometimes an attenuator is used to provide isolation between two circuits to prevent one circuit whose impedance varies with frequency from affecting the other circuit, the loss of the attenuator being part of the price paid for the isolation which is obtained. Also it is possible to use attenuators, under certain circumstances, for wide-band impedance transformation. Again there is a price paid because of the loss, although sometimes this can be used to advantage. For instance a gain measuring attenuator constructed by the author can be adjusted in ½ dB. steps up to 60 dB. loss (600 ohms in and out) plus 600 ohms to 50 ohms with 20 dB loss.

Of the attenuator types shown in the following tables all have constant 600 ohm input and output impedances, however three are unbalanced and four are balanced types. For wide-band use the resistors should be non-inductive. The balanced types are preferable to the unbalanced types if the circuits permit their use. Also it is not desirable to use more than 40 dB attentuation in a single attenuator if flat frequency response is required. For use at radio frequencies great care must be taken to keep leads short and capacitances to ground should be balanced.

All except the bridged T types may be used at other impedances by multiplying all values by Z-600 where Z is the desired impedance.

(Note that resistance values should be kept within 1 per cent of the tabulated value to keep attenuation within about 0.1 dB of nominal value . . . . . Ed.) ●

Voltage loss in dB	T and H types R1 ohms	T and H types R2 ohms	Pi and balanced Pi types R1 ohms	Pi and balanced Pi types R2 ohms	Lattice types R1 ohms	Lattice types R2 ohms	Bridged T and balanced Bridged T types R1 ohms	Bridged T and balanced Bridged T types R2 ohms
0.1	3.58	50,204	7.20	100,500	3.58	100,500	7.2	50,000
0.2	6.82	26,280	13.70	57,380	6.82	57,380	13.8	26,086
0.3	10.32	17,460	20.55	34,900	10.32	34,900	21.0	17,143
0.4	13.79	13,068	27.60	26,100	13.79	26,100	28.2	12,766
0.5	17.20	10,464	34.40	20,920	17.20	20,920	36.4	10,169
0.6	20.9	8,640	41.7	17,230	20.9	17,230	43.2	8,333
0.7	24.2	7,428	48.5	14,880	24.2	14,880	50.4	7,143
0.8	27.5	6,540	55.05	13,100	27.5	13,100	57.6	6,250
0.9	31.02	5,787	62.3	11,600	31.02	11,600	65.4	5,504
1.0	34.5	5,208	68.6	10,440	34.5	10,440	73.2	4,918
1.5	51.8	3,452	104.3	6,950	51.8	6,950	113.4	3,174
2.0	68.8	2,582	139.4	5,232	68.8	5,232	155.4	2,316
2.5	85.9	2,053	175.4	4,195	85.9	4,195	200.4	1,796
3.0	102.7	1,703	212.5	3,505	102.7	3,505	247.8	1,452
3.5	119.2	1,448	258.0	3,021	119.2	3,021	297.6	1,209
4.0	135.8	1,249	287.5	2,651	135.8	2,651	351.0	1,025
4.5	152.2	1,109	324.6	2,365	152.2	2,365	407.4	883.7
5.0	168.1	987.6	364.5	2,141	168.1	2,141	466.8	771.2
5.5	184.0	886.8	405.9	1,956	184.0	1,956	530.4	678.7
6.0	199.3	803.4	447.5	1,807	199.3	1,807	597.0	603.0
6.5	214.6	730.8	492.6	1,679	214.6	1,679	667.8	539.8
7.0	229.7	685.2	537.0	1,569	229.7	1,569	743.4	484.3
7.5	244.2	615.6	584.7	1,475	244.2	1,475	822.6	437.6
8.0	258.4	567.6	634.2	1,393	258.4	1,393	907.2	396.6
8.5	272.3	525.0	685.5	1,322	272.3	1,322	996.6	361.2
9.0	285.8	487.2	738.9	1,260	285.8	1,260	1,091	329.9
9.5	298.9	453.0	794.4	1,204	298.9	1,204	1,191	302.2
10.0	312.0	421.6	854.1	1,154	312.0	1,154	1,297	277.6
11.0	336.1	367.4	979.8	1,071	336.1	1,071	1,529	235.6
12.0	359.1	321.7	1,119	1,002	359.1	1,002	1,788	201.3
13.0	380.5	282.8	1,273	946.1	380.5	946.1	2,080	173.1
14.0	400.4	249.4	1,443	899.1	400.4	899.1	2,407	149.6
15.0	418.8	220.4	1,632	859.6	418.8	859.6	2,773	129.8
16.0	436.8	195.1	1,847	826.0	835.8	826.0	3,186	113.0
17.0	451.5	172.9	2,083	797.3	451.5	797.3	3,648	98.68
18.0	465.8	152.5	2,344	772.8	465.8	772.8	4,166	86.4
19.0	479.0	136.4	2,670	751.7	479.0	751.7	4,748	75.8
20.0	490.0	121.2	2,970	733.3	490.4	733.3	5,400	66.66
22.0	511.7	95.9	3,753	703.6	511.7	703.6	6,954	51.72
24.0	528.8	76.0	4,737	680.8	528.8	680.8	8,910	40.4
26.0	542.7	60.3	5,985	663.4	542.7	663.4	11,370	31.66
28.0	554.1	47.8	7,550	649.7	554.1	649.7	14,472	24.87
30.0	563.0	37.99	9,500	639.2	563.2	639.2	18,372	19.58
32.0	570.6	30.16	11,930	630.9	570.6	630.9	23,286	15.46
34.0	576.5	23.95	15,000	624.4	576.5	624.4	29,472	12.21
36.0	581.1	18.98	18,960	619.3	581.1	619.3	37,260	9.66
38.0	585.1	15.11	23,820	615.3	585.1	615.3	47,058	7.65
40.0	588.1	12.0	30,000	612.1	588.1	612.1	59,400	6.06

Modifications to the R390A/URR

part two

JOHN WEIR, VK3ZRV
221 St. Helena Road
Greensborougt, 3088

I must begin this part of my article with an apology for the discontinuity and a small explanation.
The changing of QTH in my case was a rather drawn out affair, which meant all the gear had to be stored, causing quite a deal of disruption to the modification plan.
Now things have settled down, and the initial hurly burly of unpacking and finding everything again has been overcome, I hope to be able to complete the series started in July, 1973, in concurrent additions of AR.

In the first part of the article I spoke of changing the RF Amp V201 from a 6DC6 to a 6GM6. This I have done with quite good results. When the R390A is correctly aligned, the makers specifications state as follows —

AM SENSITIVITY at 10 db S/N plus N Ratio

750 kHz	4uV max
6 MHz	4uV max
14 MHz	4uV max
20 MHz	5uV max
26 MHz	5uV max
30 MHz	5uV max

CW SENSITIVITY at 10 db S/N plus N Ratio

ALL Bands	1uV max

To be able to find just what difference the modifications made I aligned my receiver equal to or slightly better than the above figures. The circuit for the RF amplifier in its original state is shown in Fig 1.

A straight swap of the 6GM6 for the 6DC6 proved rather disastrous, and had me thinking for a while until I had a closer look at voltages on the valve and read the maker's specifications. The result was that the screen voltage for the 6GM6 was far too high, the gain of the receiver was up, but so was the noise; out of all proportion. After some more reading and a bit of trial and error the circuit as shown in Fig 2 was evolved and no marks are claimed for originality. With this circuit installed, another re-alignment was carried out, and it was found that the maker's specifications were bettered by about 6db across the board. For those who cannot obtain 6GM6's, you should note that a 6BZ6 with the circuit as shown in Fig 2 is also better than the original, but not as good as the 6GM6. A further point to note is that a 6EH7 is a 9 pin version of a 6GM6 but there could be a problem making it fit into the available space.

The next problem to overcome is the tuning rate of the kHz control which is too high for easy resolving of SSB (100kHz per knob revolution). A bit of thought produced the tuning knob from an R1155 receiver. This is a two speed knob with a direct and (after modification) a 15:1 reduction. This knob was fitted to the receiver and now there are two tuning rates, one at 100kHz per revolution, the other at

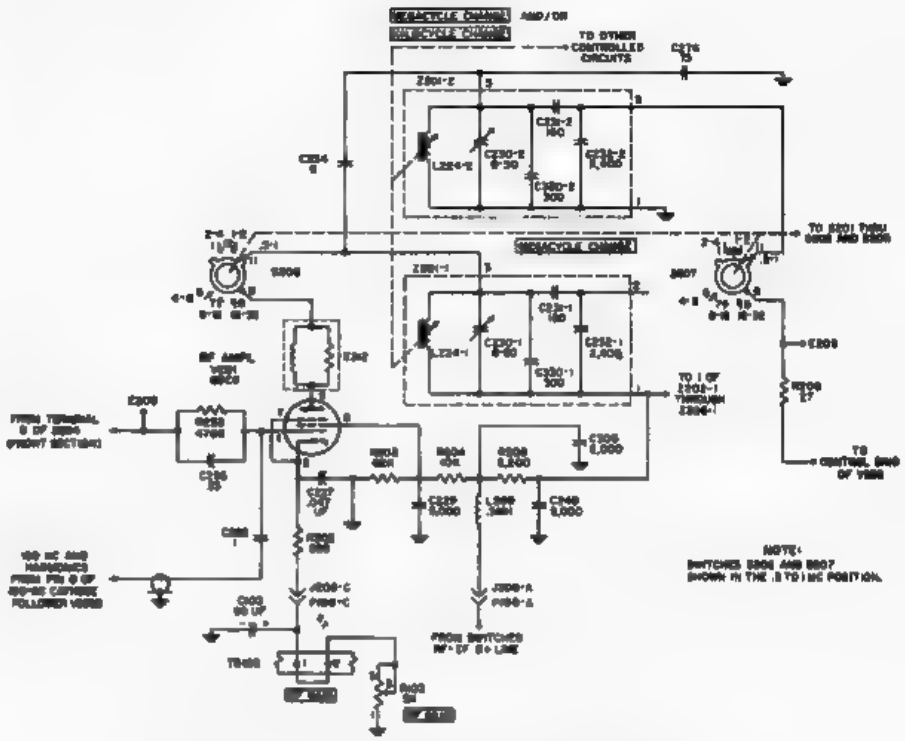


Figure 1. Rf amplifier V201, schematic diagram.

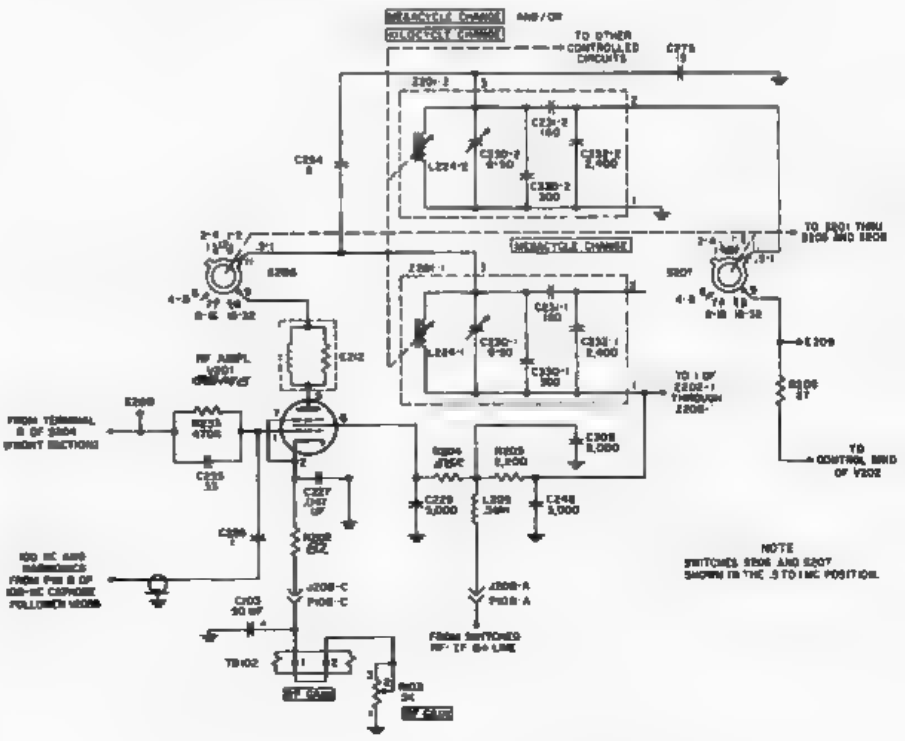
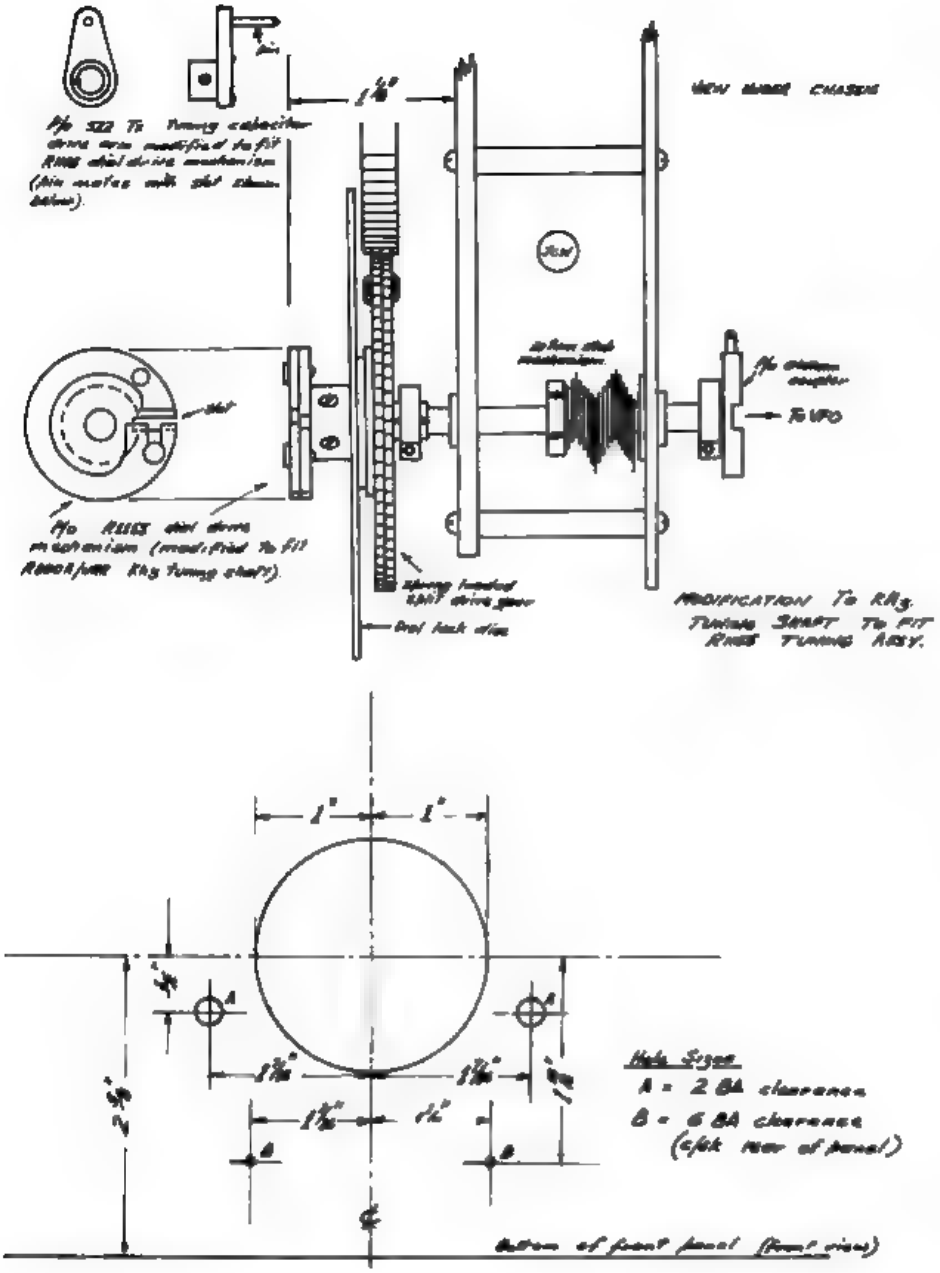


Figure 2. Rf amplifier V201, schematic diagram. (modified)



FRONT PANEL DRILLING DIAGRAM (Fig 4)

approximately 6.5kHz per revolution. have attempted to show in Figs 3 and 4 as much detail as possible as to how this was done, and the drilling template for the style of knob used. I say this because information recently received leads me to believe that there were a number of different style knobs used on the R1155, and there could be some minor changes in the measurements.

Finally, for this part of my article, I will be only too happy to answer personally any queries via an eyeball QSO or an SAE to my QTH. To those whose enquiries I have answered in the past, I hope the answers were those required. If not, please write again. ●

Key Section

with Deane Blackman VK3TX

Box 382, Clayton Vic., 3168

It is with some pleasure that the section welcomes Fred, VK4RF, as the new co-ordinator for Queensland. Fred has been at CW for 37 years, he tells me; thanks for your help Fred.

I used up my quota of operating time at Christmas on the WICEN Exercise, and so did not participate in the Ross Hull. A little bird has told me that there were at least 15 stations, representing all states, heard using CW. This is very encouraging, and justified the efforts of the Key Section to get the CW section back into the contest — especially if they all put in their logs.

I have had a letter from Jon, VK6TU, in response to my comment about morse practice in this column a few months ago. Jon has a couple of one-hour cassettes at 6 and 8 WPM. Anyone interested should send a cassette plus 50 cents (to cover postage), or he will provide a cassette for you for $2.00 all round. A letter in Dec 1973 AR from ZL2BFR also advertises CW tapes. On air, the Western Suburbs Club is running CW on 160M, and of course VK2BWI appears night after night on 3535kHz at 1930 Eastern. Let me again pay tribute to the small hard-working band of blokes who run these sessions; it's a great service you do. There does seem to be plenty of opportunity for practice.

We have received an application from a SWL for membership which is embarrassing only to the extent that although it has been our intention to provide a SWL — award, no details have yet been worked out. We'll fix you up in time, though, IRA. ●

EMERGENCIES AND ACCIDENTS

In the October 1973 issue of Radio ZS under the heading "Public Participation in combat of crime" correspondence was printed which showed that Radio Amateurs could volunteer for enrolment in a special auxiliary service of the South African Police known as Wachthuis Radio Reserve. Permission was granted for amateurs to pass messages regarding emergencies or crime for onward transmission to the Police. "The purpose of the introduction of Radio Amateurs is to obtain a wider and more efficient communication system for internal security and the combat and prevention of crime."

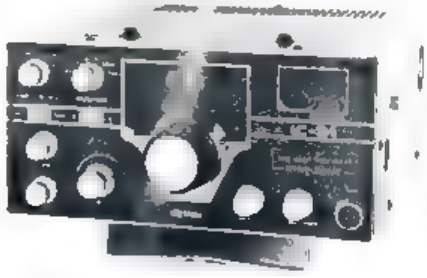
DRINKING DRIVERS

ZL1HV writing in Break-In November 1973 drawn attention to a "fit to drive" ignition lock for cars, recently developed in Europe. It is based on the critical Flicker Factor, the point at which a light changes from steady to pulsing. A pre-punched card programmes the unit and after inserting it in the ignition lock the driver uses an eyepiece to test himself. Three failures to stop the unit at the correct frequency between 20 and 70 Hz results in a 'lock-out' and the car cannot be started. Unfortunately we all know many drivers who will stop at the pub and leave the ignition switched on.

RTTY

The very first issue of "Keybaud" issued by AARTG (Australian Amateur Radio Teleprinter Group) of Box 16, Morley W.A. 6062 lists the Australian RTTY standards for the new RTTY man as speed 45.45 bauds shift 170 Hz on 3.54, 3.59, 7.04, 7.09, 14.09, 21.09 and 28.09. MHz with 45.45-50 bauds and 170 and 850Hz shift on 146.600MHz (channel 52). A wealth of other information is also in this first issue of the quarterly magazine as well as listing the AARTG net on Mondays 12.00z 3.59kHz. ●

INOUE VHF-UHF transceivers



1. Current customs procedures requires your signed written order and 5 copies of your Amateur Licence. We will make By-Law application on your behalf.
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Newcomers Notebook

with Rodney Champness VK3UG

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EQUIPMENT LAYOUT and DESIGN

Part 1

How often do you hear someone say that the piece of equipment they have just built from someone else's circuitry and ideas doesn't work? Have you designed something yourself that hasn't worked as it should have? These are the problems that beset virtually all newcomers to electronics.

If you are a genuine experimenter and don't just build things from kits, you will need to know how to stay out of trouble with your component layout and initial design. As a newcomer you cannot be expected to be able to know all the pitfalls straight away. If you have done quite a bit of conscientious study of the fundamentals as I indicated in January's issue you will more readily pick the important points on which a successful design is brought to operational condition.

If you are going to design your own equipment, whether it be a simple power supply or a multiband SSB transceiver, you will first need to sit down with pencil and paper and physically design the circuit working out component values, voltage ratings, current ratings, making allowance for component value spread and possible variations in mains voltage. I would suggest that you consult the various books and magazines that are available for circuit suggestions, general component values and the like. Here is one often overlooked parameter. Never run, for example, a 1 watt resistor at 1 watt unless you have very good ventilation around it. Underneath an unventilated chassis is not the coolest spot. Likewise, capacitors should be chosen with a voltage rating that makes allowance for both DC (and RF/AF voltages which may be superimposed) and then some. When using diodes, whether they are valves or semiconductors, make sure that the Peak Inverse Voltage rating is at least 3 times the DC output of the rectifier diode. It is simple little things like this that can spoil a project.

Make sure that you drill holes in the chassis, if you are using one, so that air can flow through the whole unit. Air should be able to flow in through holes in the bottom or sides of the equipment and the heated air should be able to escape through the top of the case. If the metal work is to form part of shielding systems for RF, these holes must be reasonably small of the order of about ⅛" diameter. You will need to drill quite a few as small holes do not let much air through.

In these times an additional decision must be made—solid state—valved—or hybrid? Think particularly what you want your piece of equipment to do. There are some jobs where valves are still the best, and others where transistors are better. In some cases a combination of valves and transistors may well give the best results. I would say that it is becoming rare for a piece of equipment to be designed exclusively with valves. Hybrid designs using valves and semi-conductors are very common, and the percentage of semi-conductors in equipment is rising. There are a number of people who use equipment consisting only of semi-conductor active devices. Whatever you decide to use in your equipment use the devices which give the best performance consistent with cost, availability and power source. If the power source is a 12 volt battery perhaps the equipment should be mostly transistorised or exclusively so. If the power source is 240V AC, valves could still be a good decision.

Wherever possible use common garden-variety components, those which are easy to obtain and relatively cheap. With the component crisis at the moment, and the proliferation of types of devices to use, it pays to be sure the item bought can be replaced should something go wrong with the equipment once it is built. This is particularly so for the newcomer. The more advanced experimenter can more easily work out substitutions. Occasionally the purchase of a rather exotic component at relatively high cost can far outway the cost and complexity of the circuitry using more conventional circuitry.

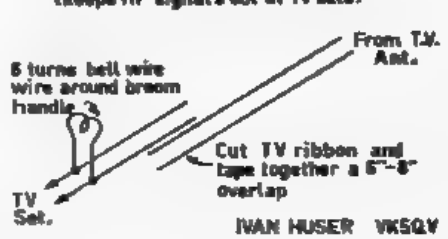
CONCLUSION

Think carefully about what you want to build before you build it. Design the equipment to do what you want. In the process you may find some features difficult to incorporate so perhaps another piece of equipment should be designed to do that job. You may need to design and redesign on paper this particular project until a successful design is reached. Check that you are not over-rating any of the components. Once the design is finalised, then comes the laying out of the equipment which will be covered in next month's column. ●

Try This

with Ron Cook VK3AFW
and Bill Rice VK3ABP

SIMPLE HIGH-PASS FILTER
(keeps HF signals out of TV sets)



IVAN HUSER VK5QV

MICROPHONE INPUT TO AWA CARPHONE

After trying several mic pre-amps in my MR20A carphone with unacceptable results (hum, etc) a simple answer was suggested by a junior member of our group.

Audio from a rocking armature insert was fed directly into the carbon microphone transformer, with one side grounded. This resulted in adequate deviation with some reserve in the deviation control. This idea is applicable to all AWA sets using carbon microphone transformers.

Jim, VK2ZVJ

ROOF TOP ARCHERY

A curious title, but nevertheless relevant.

The problem was to raise a 40m dipole beyond two chimneys some 10m apart, over a slate roof. The only ladder available just being capable of reaching the spouting. Because of the slate roof, throwing a weighted line was not very practical.

The solution was to rig up a crude bow and an arrow of thin dowelling with a nylon fishing line attached.

A few practice shots on the ground confirmed the range and reasonable directivity. Then, up on the kitchen roof, and "ZING" —there was the line beyond the two chimneys. The dipole was attached, hauled across, and minutes later we were on the air.

J. R. Dunne, VK3AXQ

DRILLING BOOMS FOR YAGIS

When constructing Yagi aerials, it is often difficult to get all the elements in line, mainly because of difficulty in marking and drilling the holes in line along the boom.

A simple method is to lay the boom on flat ground or a path, with another tube of similar dimensions alongside, both held firmly together by hand or preferably with G-clamps. Then run the back of a hacksaw blade along the top surfaces, scoring both pipes, thus leaving a straight line along the top, which can be centre punched. It is suggested that a V-block be used for drilling.

Allan Hyslop, VK3ZNB
George Francis, VK3ASV

THE TRUTH ABOUT THE BANDS

Those SWL's using the SW bands of a 2 or 3 band portable receiver which is calibrated in metres would have found, for example, that the 40m band isn't 40m on the dial, it is really 42m!

Here is a table of the metre equivalents for the boundary frequencies of the major HF bands.

F in MHz	METRES
1.8	166.6667
2.0	150.0000
3.5	85.71429
3.7	81.08108
7.0	42.85714
7.1	42.25352
14.0	21.42857
14.35	20.90592
21.0	14.28571
21.45	13.98601
28.0	10.71429
29.7	10.10101

It is hoped that this table will help SWL's and HAM's alike.

Thanks to Miniwatt, WA Uni's computer system. Robin Edwards, L80181 ●

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Amongst the comprehensive range of SCALAR ANTENNAS there are some of special interest to the Radio Amateur. These include our VHF & UHF, Citizens Band Range, HF Mobile and Base Station Units for Land & Marine applications, for example . . .

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Commercial Kinks

with Ron Fisher VK3OM
3 Fairview Ave., Glen Waverley, 3150

For the past few months I have been playing with two metre FM transceivers of various types and I must admit that I am fascinated. This month I will relate some of my modifications to the AWA MR6a.

Operating the MR6a from AC. It seems that when many Amateurs think about AC operation of their carphones, they automatically think of heavy duty regulated 12 volt DC power supplies. However this can be difficult and it is often better to run the unit from a standard AC supply with voltage output equivalent to that required by the particular transceiver. Although this description applies to the MR6a, no doubt it could be adapted to almost any valve type transceiver. The MR6a requires about 300 volts for the transmitter final stage and 150 volts for the transmitter driver stages and receiver.

I happened to have an A&R voltage doubler type transformer with 125 volts output at 125 milliamps capacity at the doubled voltage output. As the MR6a has plenty of filtering built in, very little is needed in the power supply. I found that the two series 100 mfd doubler capacitors were all that was required. The only non-standard requirement is that the negative return for the high tension must be insulated above earth.

Another possibility for a power transformer is an old 115/240 volt step-down unit provided it is double wound and not an auto winding. A separate filament transformer would be needed. The twelve pin power connector on the MR6a chassis is now modified so that both the AC supply and a 12 volt DC source can be used.

Remove the link between pin one and pin ten.

Remove the green and black connections to pins eleven and twelve.

Solder both of these to the now vacant pin one. We now have pins ten, eleven and twelve clear. Connect pin ten to the negative line in the MR6a.

A good place to do this is at the negative end of C106 a 25mfd electrolytic. You should be able to measure 470 ohms to ground from this point.

Pin eleven of the power socket is now connected to the positive side of C111. This is located above the chassis right beside the final tube. Pin twelve is connected to the positive end of C112 24 mfd, or to the positive point on the PA metering socket.

This completes the modifications to the MR6a. The AC supply is connected as follows. HT negitive to pin 10. 150 volts to pin eleven. 300 volts to pin twelve. 12.6 volts AC to pin four with the earth return to pin two.

The twelve volt DC connections remain the same except that the bridge between pins 10, 11 and 12 on the female socket must be removed.

A Rocking Armature Microphone with the MR6a.

The MR6a article in September, 1973 AR must have applied to a different model to mine as neither the 12AU7 or the microphone transformer were in my set. Instead the carbon mike was fed directly into the grid of a triode-connected 6AU6. As the rocking armature microphone requires more gain the 6AU6 is rewired as a pentode.

Replace the 6AU6 plate load resistor R61 100k ohms with one of 470k ohms. Cut the connection pins 5 and 6 on the 6AU6 socket and wire a 1 meg resistor from pin 6 to the HT tie point. Bypass pin 6 to ground with a .02 disc ceramic capacitor. The coupling capacitor from pin 5, a 470 pf, should be changed to a .01 mfd to improve the audio response. Remove the 1k resistor across the microphone input. Remove the two paralleled 33k ohm resistors R54 and R56 which were used to feed operating voltage to the carbon microphone.

A three pin DIN socket was fitted to the side of the front panel as an input connector and a right angle DIN plug wired to the new microphone.

If you find a little more microphone gain is needed increase R64 82k ohms to 1meg ohm.

With these modifications your MR6a will be a versatile and smooth sounding rig. ●

WIA 2m BAND PLAN

As announced briefly in Oct '73 AR (p4) there is now in existence an Australia-wide WIA 2m band plan to include simplex and repeater channels.

Channel Numbering System:

Official encouragement is given to rounding off all the existing 2m band FM net frequencies to the nearest 50kHz. Channels shall be numbered on a numerical basis beginning with Channel 0 as 144.000MHz and that Channels 0 to 20 be allocated at a future date (i.e. 144.000 to 145.000MHz).

To assist in identifying Channels with frequencies the following short table may be useful:—

Freq: MHz	Channel No.
145.500	30
145.750	35
145.850	37
145.950	39
146.000	40
146.500	50
147.000	60
147.500	70

2m FM Repeater Frequencies:

Input MHz	Channel	Output MHz	Channel	
146.100	42	146.700	54	(1)
146.200	44	146.800	54	(2)
146.300	46	146.900	58	(3)
146.400	48	147.000	60	(4)

The following **secondary** channels were designated for future use.—

Input MHz	Channel	Output MHz	Channel
146.150	43	146.750	55
146.250	45	146.850	57
146.350	47	146.950	59

It was agreed that repeater channels 42/54, 44/56, 46/58 and 48/60 should be available for use as soon as possible after approval by the PMG Department. It was also agreed that the change-over to the new frequencies would be carried out as soon as appropriate.

National 2m FM Simplex Channels—

The following are adopted:—

Freq.	Channel	Remarks
146.450	49	
146.500	50	National calling frequency
146.550	51	
146.600	52	National RTTY channel
146.650	53	

PMG Department.

The Controller, Regulatory and Licensing in letter RB4/4/29 of 27-11-1973 advised inter alia, "the Department has no objection in principle to the use of the frequencies listed (the new repeater input and output frequencies — Ed). Each proposal, of course, will be examined in relation to adjacent services at the proposal site, and the expected growth rate of radio services in the area concerned. Special conditions in relation to the equipment characteristics and operational procedures will be set by the Department in each case. The Department is in sympathy with efforts to standardise the frequencies used for WIA repeaters."

Previous Frequencies.

The WIA 2m band plan, as shown, will lead to the discontinuance of frequencies previously in use throughout Australia.
Channel 1 - 146.1MHz in / 145.6 out
Channel 4 - 146.4MHz in / 145.9 out
Simplex Ch. B - 146.000MHz, Ch. A - 145.854MHz and Ch. C 146.148MHz
Unused repeater Channels 2 and 3.
All are for plus or minus 15kHz deviation.
The Satellite 'window' on 2m extends from 145.825 to 146.000MHz.

Present Indications

At the time of writing there is a dearth of definite news about future plans. The Victorian Division announced early in Dec. that applications had been made to their Radio Supt., to introduce new repeater call-signs and changes of channel allocations from 2-3-1974. Applications were stated to have been lodged for Mt. Dandenong and Mt. William repeaters Ch 42/54, Mt. Tassie repeater Ch. 44/56 and Ch. 48/60 repeaters for Mt. Anakie and Mildura. All their repeaters will be using an FSK CW identification. It is understood that the Adelaide repeater Ch 42/54 will be put into use before or by 1st March, 1974. In Tasmania it is believed that the Mt. Barrow (North East) repeater will change to the new frequencies on 2nd March and that the Mt. Wellington (Hobart) repeater for Ch 42/54 may become operational soon thereafter.

VHF UHF
an expanding world

with Eric Jamieson VK5LP

Formation, S.A., 5333

Times. GMT

VK0	VK0RSG, Macquarie Island.	52.160
	VK0MA, Mawson	53.100
	VK0GR, Casey.	53.200
VK2	VK2WI Sydney. x	52.450
	VK2WI, Sydney. x	144.800
VK3	VK3RTG, Vermont.	144.700
VK4	VK4WI 2 Townsville.	52.800
	VK4WI 1, Mt Mowbullan.	144.400
VK5	VK5VF, Mt Lofty.	53.000
	VK5VF, Mt Lofty.	144.900
VK6	VK6VF, Bickley.	52.006
	VK6RTU, Kalgoorlie.	52.300
	VK6RTT Carnarvon.	52.900
	VK6RTW, Albany.	144.500
VK7	VK7RTX, Devonport.	144.900
VK8	VK8VF, Darwin.	52.200
VK9	VK9GA, Goroka. x	52.001
ZL1	ZL1VHF, Auckland.	146.100
ZL2	ZL2VHF, Wellington.	146.200
	ZL2VHP, Palmerston North.	146.250
ZL3	ZL3VHF, Christchurch.	146.300
ZL4	ZL4VHF, Dunedin.	146.400
JA	JA1IGY Tokyo.	52.800

x — denotes new listing.

Additionally to the above, there is a cluster of beacons around 50.100, HL9WI in Korea, 3D3AA Fiji, 5W1AR West Samoa, CEOTS Easter Island, FO8DR French Oceania, ZK1AA Cook Island. Also KH6EQI Hawaii is on 50.104, KX6HK Marshall Islands 50.110 and WB6KAP California spasmodically on 50.013. There are plenty of beacons to look for if you want to start. With the coming of the equinoxial period soon, it might pay to tune further than the first 100kHz of 52MHz.

The VK2 beacons are listed this month after a long wait. Although no direct word of their operation has come my way, it appears they have both been heard with some consistency in Canberra, which seems to be reasonable for recording purposes. We also welcome the listing of the Goroka, Niugini, beacon VK9GA near the 52MHz band-edge.

We now appear to have a very good Australia wide coverage of beacons, and hopefully we look forward to VK1 getting the necessary licence for their beacon sometime in 1974. I have been hinting about the lack of licence for this one for some time. When it is granted, I hope to receive from the Canberra boys a nice bottle of sparkling mardi gras so I might drink a toast to the last VK call area to have its beacon. Thanks in advance chaps!

52MHz AND THE DX

As always, the conclusion of the Ross Hull Contest saw most of the activity ended on 6 metres. Certainly band conditions do tend to drop off fairly rapidly as January progresses, but I don't believe it finishes as rapidly as band occupancy might seem to indicate. The foul weather which has persisted over a great portion of Australia for the last three weeks in January was enough to make anyone close down. I think too of the losses which must surely have been suffered by many of the amateurs in Queensland in some cases whole shacks must have disappeared. Can those living in the south and other areas not worried by floods do anything to help? Equipment is scarce, but maybe there are surplus parts lying around. If someone in VK4 was prepared to co-ordinate requests and distribution, I am sure there would be fellow amateurs prepared to assist in some way.

While on the 6 metre scene, I have received a very interesting letter from Geoff VK3AMK, and as its contents are so relevant to the "DX season" through which we have passed, that I can do no better than to record his views for all to read, with a few comments of my own at the end.

"We have just had one of, if not the best, summer "DX seasons" for many years. Several things arose during this season which I feel could be discussed through your page in "A.R.", which is the only natural forum for VHF in this country.

"The first matter concerns the claim by some AM operators that people using SSB are unwilling to talk to AM stations. The situation has now been reached where virtually all serious DX operators are using SSB. This mode has proved itself beyond doubt on both HF and VHF. In my opinion the problem with the remaining AM stations is (a) most lack VFO control, and (b) the stability and percentage of modulation in many cases could be improved.

"I would say that there are virtually no stations operating SSB that **WON'T** talk to AM stations, but vast numbers who find they are **UNABLE** to talk to them. By using transceivers, most SSB stations now are VFO controlled and operate on the same frequency as the station they are working. Often a rare station such as a VK9 (P29) or VK0 or ZL's will have dozens of replies to a "CQ" and naturally stays on the one frequency until all callers have been worked. If an AM station operating crystal locked is calling 200kHz up the band, the DX station cannot be expected to leave the other callers and start tuning. Almost all SSB stations listen on their own frequency before tuning, and very often are called on that frequency before tuning. It is surely not beyond the capabilities of those holding Amateur licences to build a VFO, by using a VFO to operate on the frequency of the calling station the AM operator has an equal chance to work DX.

"One reason that I personally have difficulty in working AM stations is, the often unbelievable instability of the signal (drift and FM) and poor modulation. Many of these stations come up year after year with the same fault. One in particular drifts anything up to 20kHz. A VR tube or Zener diode in the oscillator circuit, plus about 15 minutes of their time would probably improve stability. What happens of course is that the SSB station zeros to the AM signal and then follows it up the band and comes back often on top of another QSO up or down the band the AM station wondering where the SSB operator has got to.

"Even a slight amount of FM makes copy difficult on an SSB receiver but how many AM operators seem to worry? Residual hum on the carrier does not help matters either, especially when signals are weak or suffering deep QSB. By far the greatest problem is lack of modulation. One rare station in particular has to be almost S9 here to be really readable even on a good receiver with AM facilities. Very few SSB transceivers have any provision for adequate reception of AM other than in the exalted carrier condition unless there is plenty of modulation. The usual 2.1kHz filter makes copy really difficult, but given a **GOOD AM SIGNAL** there is **NO** problem. By "good" I mean, no drift or FM, adequately modulated. Anyone who doubts this should have a listen to Lance VK4ZAZ sometime, if his signal cannot be copied on an SSB receiver, the receiver is faulty!

"Many times I have VFO'd on to an AM station's frequency, listened to a long "CQ" and then heard "VK . . tuning from band edge up." Often when the station is operating on 52.3 or 52.4MHz. Very few SSB stations have the luxury of external VFO's to call and listen on two frequencies. I have even heard AM stations call then tune almost everywhere other than their own frequency and go QRT without being aware of someone calling repeatedly on their frequency, this may seem an extreme example, but it does happen.

"Other AM stations operating with a single crystal pick band edge or plus or minus a kHz or two as "their" frequency. Others operate on known calling frequencies such as 52.050 or 52.100MHz either unaware or not caring about QRM. A few years ago many Melbourne stations spent about an hour trying to call a ZL1 near band edge while a VK4 operating mobile in Melbourne on AM cruised around calling CQ crystal locked on the ZL1's frequency. When called by the SSB stations and asked if he could QSY or QRT for awhile the mobile simply replied "sorry I can't copy SSB" and went on calling CQ ad infinitum!

"One of the myths still believed by many is the "DX season" (especially on 6m). Certainly there is a peak but there is also a "Winter season" etc, too. A re-reading of the VHF notes in October 1973 "A.R." may help convince the non-believers. A study of the lower TV channels (Ch. 0 and Ch. 2 especially) throughout the year will prove most enlightening. Winter conditions on 6m. are often very good but rarely is there anyone around to take advantage of it. Many people start looking for 6m. DX around the early part of December but over recent years the band has opened any time after the beginning of October, in fact during November 1973 all call areas of VK and ZL1 4 were heard-worked from VK3.

"Two metre DX is something which seems likely to produce more contacts over greater distances in coming years. During the summer of 1973 - 74 there were numerous openings on both tropo and Es. At least three different openings from Melbourne to VK4 were worked on sporadic E (Es) and one to VK8 on tropo. These were all as a result of mere chance or trying 2m because 6m was reasonably good. With relatively few active 2m stations outside the capital cities, it makes one wonder how much could be done with a little effort and thought. I worked VK4ZAA, VK4ZDI, VK4ZEL and VK4ZNC in Brisbane plus VK4ZAZ Rockhampton on Es, and VK8KJ and VK8WG Albany on tropo. VK5SU worked VK1 and VK2 on 2m, and ZL1QI reported hearing the VK5VF beacon at Tauranga on 1-12-73 at 0830Z. Finally, one of the most heartening features was surely the appearance of no less than thirteen ZLs on 6m during the summer, including all call areas . . . Geoff. VK3AMK."

Many thanks for your letter Geoff, there are plenty of facts and pertinent points raised in these comments. They need not be a cause for any arguments, if they hit home rather hard on some people's shoulders, then maybe some corrective action can be undertaken before the end of the year. I would like to add a comment regarding the level of modulation. Some station operators like to mention they are running 100 watts input. The books tell you 50 watts will modulate an AM transmitter of that power adequately. Such modulators might give 50 watts of audio at the plates of the output tubes, but losses occur in the modulation transformer and elsewhere, so the final output may be quite a bit below 40 watts. Stations with modulators with a capability of about half the RF power output would do well to reduce the input power to the final equal to that of the modulator output, and see what a difference this makes. If the modulator has been properly constructed to include a high level clipper and negative cycle loading, the high audio level will not spread your signal to the detriment of others.

On the latter point, when I used AM on VHF I used to run 100 watts of RF and 120 watts of audio through a high level clipper. I never had trouble being copied by SSB or AM stations, and received no complaints of a broad signal. Finally, on the question of reducing input power, I carried out an experiment some years ago on 20 metres. I reduced my AM input power to 50 watts, loaded the signal up with 100 watts of audio, and promptly worked a station in Canada who gave me an SSB report of 5 x 9! I have a QSL card to prove it. The high audio level overshadowed the carrier and the signal sounded just like sideband. However, I don't suggest you try this unless you are sure your speech clipper is working properly!

REPEATER NEWS.

From 2nd March, all Victorian repeaters will be changed over to the new frequencies. Opportunity to re-assess the interference being caused due to geographical separation and the increased popularity of the devices has been taken during the changeover and from the same date two channels which are now operating on "4" will change to channel "2". The simplex 2m FM channels now in operation in VK3 are channel 50 (146.50), channel 51 (146.55) and channel 8 which is being phased out.

Mt Dandenong, VK3RML to operate on CH 1 from 2-3-74. Mt Anakie (Geelong), VK3RGL, Ch. 4; Mt Tassie (Latrobe Valley) VK3RLV, Ch. 2; and Mt Alexandra (Bendigo) VK3RBO, Ch. 2. In addition approval is being sought for new repeaters at Mt William (Grampians) VK3RMW, Ch.1; Mildura VK3RMA, Ch.4; and Mt Macedon VK3RMM Ch. 3. Application has been made to the Australian Post Office to issue a new range of more meaningful callsigns, and if granted, the callsigns listed above will be those in use. Thanks to Russell Kelly, VK3NT, Federal Councillor for passing on this repeater information.

VHF CALLING FREQUENCIES:

Confusion seems to be dying down somewhat, but observations on both 6 and 2 metres during December and January indicate most 6 metre stations prefered 52.080 and 2 metres 144.100. The choices are O.K. with me and most others I guess as long as those needing calling frequencies know them. The only thought I might add about the use of 52.100 as some advocate, is that it is located on a 100kHz check point for the crystal calibrator in most transceivers, and as such may be a little more accurate when dealing with M-S contacts and even for running the receiver in the shack. Anyone prepared to write their thoughts?

I guess there has not been a lot of news this time, but you got plenty last month.

Closing with the thought for the month:- "In the courtroom of our conscience, we call only witnesses for the defence."

The Voice in the Hills. ●

TWO NEW INSTRUMENTS FOR AMATEURS

200MHz Counter Kit (EA Dec. 73). Fully solid state with latest MSI, ICs and LED Readout. Uses 23 ICs so it's straightforward to build and very economical. Our kit is in two parts—basic counter, 4½ decades to 20MHz, complete kit (Yes crystal included!) for only **$99.00** Prescaler to 200MHz only $26. So you can build a complete 200MHz counter for only**$125.00**. (All P & P 50c).

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Transistor package offer, 2N5589, 2N5590, 2N5591 for **$22.50**

All P & P 50 cents

Data sheets on transistors available separately 10 cents (P & P 20 cents). The prototype shown here was built by Dick Smith himself. It worked despite a few short circuits. If he can get one going anyone can!!

Now Jim Rowe has built one (see Electronics Australia, Jan 74, p56-59). Quote "I can confidently give the Dick Smith '2 metre PA Superkit' a clean bill of health. Not only does it deliver the power output claimed, but it also seems quite stable and free from nasty side emissions."

As a result of all this praise, we won't put the price up—yet!!

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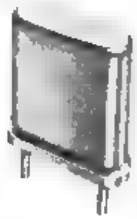

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Impedance ratio 1 : 1, 75 ohms (nominal) unbalanced to 75 ohms (nominal) balanced, 3 to 30MHz. For use at centre of a dipole antenna with co-axial feed line or at transmitter end with 75 ohm (nominal) flat transmission line. Belling & Lee L734-P connecting plug supplied.
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PRICE: $10.00

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Impedance ratio 3.1 : 1 75 ohms (nominal) unbalanced to 25 ohms (nominal) unbalanced, 3 to 30MHz. For use at the base of a mobile whip antenna, coupled to a fixed or adjustable transmitter output impedance. Connection is by lug terminals.
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Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers

Dear Sir,

The note entitled "USA Repeaters" at the bottom of page 7 of the December 1973 issue of **Amateur Radio** may tend to mislead its readers as to the state of relations between the Federal Communications Commission and U.S. amateurs. Prose Walker, the " chief of the FCC division responsible for amateur operations ," is a long-time active amateur himself, W4BW. The source from which you lifted his alleged remark is none too reliable, to say the least. W4BW's views on the future of amateur radio are more accurately reflected in QST articles such as the one beginning on page 75 of the August 1973 issue. Here you'll find such phrases as this:

", perhaps we can hope that in the future it may be possible to either **expand** existing HF amateur bands or even **obtain some additional ones** at appropriate locations in the spectrum."

ARRL and the FCC have some major differences of opinion, but we don't for a moment think that W4BW has anything but the best interests of the amateur service at heart. We're deeply distressed to see expressions to the contrary repeated in **Amateur Radio**.

David Sumner, K1ZND,
Assistant Secretary for
Membership Services,
ARRL.

Editor,
Dear Sir,

THE AMATEUR OPERATOR

In this day and age of sophisticated equipment satellites etc. it is easy to forget the primary skill of our hobby

RADIO OPERATING.

I have heard plenty of derogatory remarks about "appliance OPERATORS" but I would rather hear a good **OPERATOR** on the air than a "LID" as the W's call them, irrespective of the man's skill with a soldering iron.

I was issued with a licence to **OPERATE** an Amateur Radio Station and conduct experiments within the terms of that licence

Over the years I have built and **OPERATED** my own station; **OPERATED** "appliance's," experimented with antennas, and built test equipment. In short I have "had a go" at most of the technical side of our hobby

There is no doubt in my mind that such things as antenna experiments could occupy one's hobby time for life, and such experiments would require one to **OPERATE.**

When you boil it down, most of us want to get on the air, we want to test our equipment, our antennas, exchange ideas with other amateurs, and, sometimes just chew the rag.

Most of us also want to give the Amateur a good image in the eyes of the public, P.M.G., and the world.

OUR IMAGE IS A WORD PICTURE PAINTED BY OPERATORS.

The listener cannot tell who built the equipment.

To encourage operating skills we have various contests sponsored by amateur organizations throughout the world. It is significant that the contests cater for CW and PHONE as **separate** sections. Both modes require **OPERATING** skills of a high order to achieve a high score.

In VK we have the R.D. contest every August which is an excellent test of **OPERATING** skill. It is billed as a friendly contest and a good **OPERATOR** can make two contacts every three minutes (early in the contest), and still be friendly until he meets the "LID" who gives a 5-9 report then asks for 3 or 4 repeats.

What about VHF repeater operation? I think it is time the WIA laid down some "gentlemen's rules" and also clarified call sign exchange procedure on VHF

A FEW COMPLAINTS

Calling and answering procedure is clearly laid down and yet I heard a WIA callback where the "operator" said — VK3WI TO VK3MNO

Don't think I don't appreciate the work of the broadcast volunteers, but surely the operation of the OFFICIAL STATION should be above reproach.

At a WICEN exercise I was told that date time groups were given in local time as GMT was "too hard" for the "operator" to work out.

I hope I haven't hurt anyone's feelings with my criticism. It is offered in the belief that we should pay more attention to our **OPERATING** skills and procedures. Perhaps the odd paragraph in AR each month headed "**OPERATING HINTS**" would help as a lot of our newer Amateurs may not be aware of correct procedures and their importance in the overall image created.

O.K. chaps let the soldering iron cool off for a few minutes and look closely at your knowledge of correct **OPERATING** procedure.

Whatever the band, mode, and type of equipment you use, make sure your **OPERATING** is at least as good as your equipment.

WE hold an Amateur **OPERATOR'S** certificate of Proficiency, so we should all be proficient **OPERATORS.**

M. N. O'Burrill.

Editor,
Dear Sir,

[redacted]

During the past twelve months there has developed a noticeable awareness among hams of making an effort to speak Japanese on the air. After all, Japan is Australia's largest export market and, as a consequence, is to some extent responsible for that speed boat or extra car in the driveway. So why not get with it and learn a little about the other chap's way of life and speech. Who are we to dictate that the other fellow up there in Japan should have to speak our language exclusively and so avoid the necessity of making any effort to learn something of his mode of speech.

When first listening to the JA hams dashing off a QSO among themselves, the whole idea of communicating in their language would appear to be well nigh impossible. But is it? By comparison with 'schoolboy' French it is a pushover. First of all, there are no genders to worry about such as a male or female table. It's simply a table — full stop. For another thing there are basically only two verb tenses — present and past, with only two irregular verbs in the entire language. There is also none of the 'cough' 'dough' 'through' confusion we have in English.

If you are prepared to make the effort to say a few phrases in Japanese, the chap the other end will invariably tack 'san' on to your handle when he replies. This is considered a very polite form of greeting and decidedly more friendly than the usual 'Bill-Joe' technique.

Before you rush off and invest in an English-Japanese dictionary — don't. If you do, you will only hold up the QSO while you rifle through the pages and end up with a single word which won't contribute very much towards intelligent conversation. In the early stages of learning a foreign language, it is important to grasp how they put phrases and short sentences together. 'Good morning' 'good afternoon' and 'good night' make a simple starting point. The well worn ham conversation piece of referring to the weather and temperature makes a good introduction to simple phrasing and later on a complete sentence.

The next step could be ten minutes spent in learning to count from one to ten. You would then be in a position to reel off his R-S report in straight Japanese and become an instant success with Toshi in Tokyo. If your contact replies in Japanese you will have the advantage of a fluent Japanese language teacher without the inconvenience of attending a language class.

If you are still interested in the foregoing, then you might like to take advantage of the fact that the Hitachi Company of Tokyo produce three excellent booklets (17c-m x 11c-m) entitled 'Let's Learn Japanese' which deal with everyday conversational Japanese. As an added attraction, these booklets are completely free and you don't even need a s.a.s.e. — at least that was the position two years ago.

R B. Monfries,
[redacted]

Dear Sir,

I am much interested in corresponding with an Australian boy. Would you please send me the name and address of a boy so that I may write to him? If his hobby is amateur radio, I will be overjoyed.

I am—

Name: Noriyuki Amano
Age: 15
Address: 2696 Nikura, Weko-shi, Saituma-ken, Japan 351.
Hobbies: Amateur radio and reading.

I would appreciate it if you would answer to my letter soon.

Yours truly,
Noriyuki Amano ●

You and DX

160 METRES DX POSSIBILITIES

Here is a list of sunrise times.

The low sunspot numbers should help to make this Equinox season a good one. **All VK's are requested to operate from 1825 to 1835kHz.** This will help to minimize the QRM at both ends of the path. W1BB, W1HGT and other active W-VE 160 metre ops believe this should make for many additional QSO's.

Scheds will be held on 1802 to 1808 from 30 minutes before until 30 minutes after the following sunrise times (GMT):

March 2	1116
March 3	1116
March 9	1106
March 10	1105
March 16	1054
March 17	1053
March 23	1042
March 24	1041
March 30	1030
March 31	1028

Again we will be QSX for VK's from 1825 to 1835kHz. Maybe CU on 160??

Ralph — W1HGT

USSR AMATEUR PREFIXES

Individual stations licensed up to the end of 1969 still use prefixes in the series UA, UB, UC, etc. Stations licensed from 1970 onwards and club stations are using prefixes in the UK series. The following list is presented to aid identification of stations using the UK prefix

UK1 (except UK1N)	UA1-6
UK1N	UN1
UK2A	UC2
UK2B	UP2
UK2C	UC2
UK2F	UA1-6
UK2G	JQ2
UK21, L, O	UC2
UK2P	UP2
UK2Q	UQ2
UK2R	UR2
UK2S	UC2
UK2T	UR2
UK2W	UC2
UK3	UA1-6
UK4	UA1-6
UK5 (except UK50)	UB5
UK50	UO5
UK6A, B	UA1-6
UK6C, D	UD6
UK6E	UA1-6
UK6F	UF6
UK6G	UG6
UK6H, I, J	UA1-6
UK6K	UD6
UK6L, M, N	UA1-6
UK6O	LF6
UK6P	UA1-6
UK6Q	UF6
UK6R, S, T, U	UA1-6
UK6V	UF6
UK6W, X, Y, Z	UA1-6
UK7	UL7
UK8A, C, D	UI8
UK8E	UH8
UK8F, G	UI8
UK8H	UH8
UK8I	UI8
UK8J	UJ8
UK8L	UI8
UK8M, N	UM8
UK8O	UI8
UK8P, Q	UM8
UK8R, S	UJ8
UK8T, U	UI8
UK8W, Y	UH8
UK8Z	UI8
UK9	UA9
UK0	UA0

Peter Nesbit
VK3APN ●

Intruder Watch

with Alf Chandler VK3LC

1538 High Street, Glen Iris, 3146

I have just been reading the Intruder Watch article by Art Ericson W1NF in "QST" January 1974 issue and recommend it to Members. If I may quote from it Footnote 1 — "Although we have grown accustomed to using the word 'intruder' in a rather free and easy fashion, legally we are concerned with the stations that are causing harmful interference. No. 115 of the Radio Regulations, Geneva 1959, states, "Administrations of the Members and associate Members of the Union shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations given in this Chapter or the other provisions of these regulations except on the express condition that harmful interference shall not be caused to services carried on by stations operating in accordance with the provisions of the Convention and of these Regulations." Thus, the intruder must be causing harmful interference to be the subject of a complaint Or, to put it another way, it is perfectly okay for any station of any service to operate in the amateur bands, provided that no harmful interference is caused and no complaints are received."

The above philosophy, to me is reading the Regulations literally, and so when Intruders are observed in our bands it is up to Amateurs to cause them to be 'causing harmful interference'' What say? The other quote — "Table 1 — What are Intruders? —

1800-2000kHz	— Broadcasting. Any US or Canadian non-amateur, except Loran.
3500-3900kHz	— Broadcasting. Any US or Canadian non-amateur
7000-7100kHz	— Any non-amateur station.
7100-7300kHz	— Western Hemisphere Broadcasting Any non-amateur station other than broadcasting
14000-14250kHz	— Any non-amateur station.
14250-14350kHz	— Any non-amateur station except fixed stations in the USSR
21000-21450kHz	— Any non-amateur station.
28000-29700kHz	— Any non-amateur station.

Because of complaints the Japanese fishing boat QRM in the 3.5MHz band has been quiet until recently. Unfortunately they are re-appearing again and also in the 7MHz band. Reports would be appreciated

(Alf Chandler VK3LC)
Federal Intruder Watch
Co-ordinator

Historical Section wants old mags, papers, articles, photos, drawings—up to W.W.2—for copying or as donations. Please write VK3ZS, QTHR or WIA Executive office.

Magazine Index

With Syd Clark, VK3ASC

BREAK-IN November 1973.

Solid State Lamp: SSB V AM: BDB Transceiver: An Introduction to Binary Logic: A Secondary Frequency Standard.

SHORTWAVE MAGAZINE. October 1973.

Proper Use of Transistors: Indicator for Change-Over: Another Two-Metre Converter: Pye Cambridge Transmitter Conversion for Two Metres: Note on the QRO Two-Metre Linear.

RADIO COMMUNICATION November 1973.

The G2DAF Mark 2 Receiver: Oscar 7 and its Capabilities: Toneburst Generator Using IC's: 80 M Twilight Operation.

RADIO COMMUNICATION December 1973.

The G2DAF Mark 2 Receiver: Gains and Losses in HF aerials: UHF Television Interference: The G3XGP Digital Frequency Meter, Corrections & Modifications: An Integrated Circuit Speech Compressor, Modification: 160M DX from Suburban Sites: Changes to the 2M, 70 CM and 23 CM Band Plans: Amateur Radio — The Preservation of its Right to Operate.

RADIO ZS October 1973.

Apollo Space Flight Communications: VHF Antenna Systems & Random Paths: Forty Years Minus Three: The Design of Simple Mains Transformers: FM for the Masses: Aerials and Common Sense: Beam for Two.

RADIO ZS: November 1973.

Using the Plessey SL600 Series Integrated Circuits in Transceivers: Tuning the VHF & UHF Spectrum: QRZ . . at Fort Beaufort: Meteorites for the Astronomer and the Radio Amateur: FM with Deviations.

CQ December 1973.

An Audible Meter for the Blind: Whither DX? Happiness is Visiting a Ham: QRP: Measuring Power Output: Means v Ends in Amateur Radio: Novice Shack: Square Dipole Antennas for 21 & 28MHz: SSTV: Logic Controlled Audio-SSTV Switching: Antennas: A New Design, Theory & Construction Column.

QST November 1973.

The Rollerless Ultimate: A Homemade VOX Accessory: A Single-Band Pre-amp to Improve SSB Transceivers: The Log-Periodic Dipole Array: A TTL Message Generator for RTTY & CW: A Crystal-Correlation Test Oscillator: Some Frequently Asked Questions & Their Answers: A 7MHz Vertical Parasitic Array: A Heterodyne Exciter for 432MHz.

73 October 1973.

Frequency Measuring Equipment at Microwave Frequencies: Build a Complete Receiver Front End with RCA CA3102E IC: Instant Replay for Your Tape Recorder: 2KW PEP Building Block Linear: Yet Another RF Watt-meter: Meter Legerdemain: Europe's First and Highest DX Repeater: A Balanced Dipole Antenna: Digital "HI" Generator: A Three-Stage Oscillating Ring Counter with Indicating Shift Register: Frequency Multiplication the Easy Way:

73 November 1973.

Getting Started on 450MHz: Getting Started on Amateur Television, NI-CAD Life saver: Heath GR-110 VHF Scanning Monitor: Autopatch Inter-connection the Legal Way: Frequency Aperture Modulation: Versatile Test Equipment Range Extender: A Power Supply for Small FM Rigs: A Radiating Loading Coil: Peak-Notch IC Audio Filter. ●

E M C

It is intended that September AR will be an EMC Issue . . .

Any articles on Interference and EMC generally will be gratefully received.

Dead line — 30th June

Contests

with Peter Brown VK4PJ

Federal Contests Manager, G.P.O. Box, 638 Brisbane, Qld., 4001.

GRAPHS . . . and REMEMBRANCE DAY

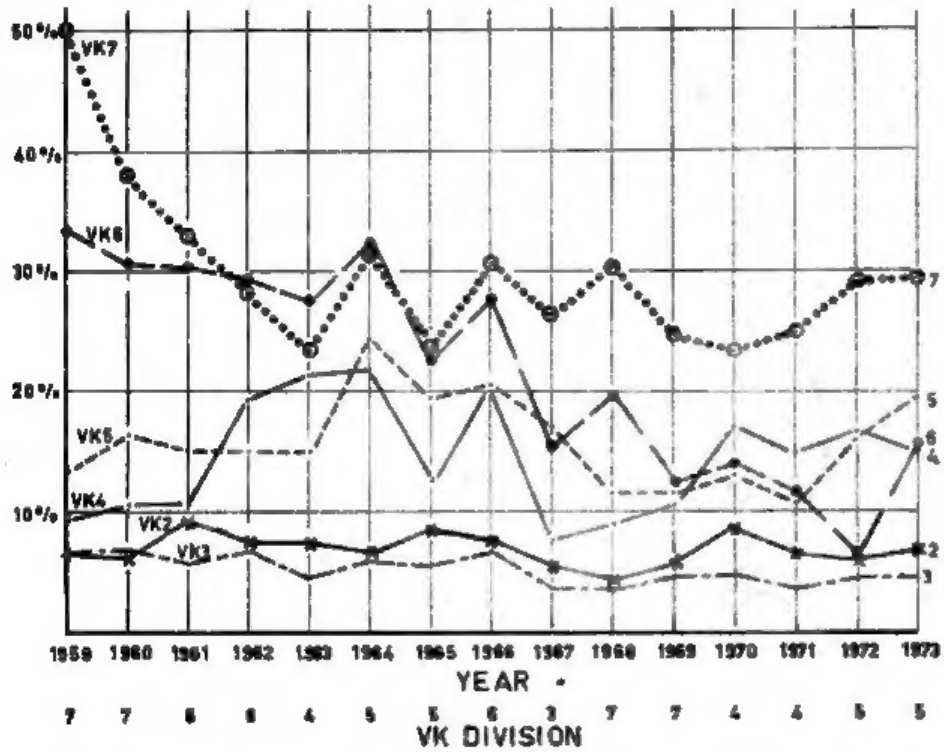
I, as also ye Ed, was disappointed with the graph reproduction in January Amateur Radio, as there was a real message there. Have another look at the graph . . . I am sure that we can do a lot better in contests.

Have a look at this month's graph . . . DIVISION PARTICIPATION RATE. The **vertical** percentage scale is participation in RD Contests.

The **horizontal** scale is the year of the contest and also the **winner** for that year is shown on the bottom line. RD contests. What can you make of it???? It could influence your ideas on improved rules!!

Note that the states with the largest number of amateurs, VKs 2 & 3, have not varied much over the years, are reasonably close together, and have lowest participation rate.

The states with next greatest amateur population, VKs 4 & 5, including VKs 9 & 9, have the next highest rates and these rates vary quite a lot.



VK6 after winning in 1966, fell back and fell to an all-time low in 1972 . . . but is on the way up again . . . greatest improvement in 1973 . . . at its present rate will soon be challenging VK7. VK7, the state with the lowest amateur population seems to be able to stay on top. I guess that the smaller states, amateur population wise, are easier to organise . . . except VK6 with their vast space? VK4 and 5 seem to be dependent on someone to organise??? or what?? Why have VKs 2 & 3 remained so steady?? VK3 has so much Federal work to do . . . VK2 has such a large area?? Not easy to provide rules for all is it? Think it over. Make sure that you tell your Federal Councillor what you want of contests. They meet next month.

CONTEST CALENDAR.

March

2nd and 3rd. ARRL DX phone contest. See Jan "AR".
9th and 10th. RSGB, BERU. See Feb "AR".
9th and 10th. YL-OM CW.A W-K-VE contest where YLs contact the OMs.
9th and 10th. World wide VHF activity.
9th and 11th. Virginia QSO party.
16th and 17th. ARRL DX CW contest. See Jan "AR".
23rd to 25th. BARTG RTTY contest.
23rd to 31st. IARC Propagation phone.
30th and 31st. CQ WW WPX SSB Contest. Don't miss this.

April.

At this time I do not have any details but these contests should be on. If you have details please advise.
7th. RSGB 80m Low power
7th - 8th ? . . . SP DX phone
? Bermuda phone.
? PACC DX
? WAEDC RTTY

BARTG Spring RTTY Contest.

I have details and on receipt of an SAE will forward you a copy in time for the contest. Send SAE to my home QTH.

CQ World Wide WPX SSB Contest.

0000 GMT Saturday 30th to Sunday 31st. Only 30 hours of the 46 for single ops stations. 18 hours of non-operating time may be taken in up to 5 periods and must be indicated in the log. All bands 1.8 through 28MHz but 2 way SSB only.
Sections. SINGLE OP. All band or Single band.
Sections. MULTI OP. All bands.
REPORTS. Usual RS and serial.
Scoring. 3 points on 14, 21, 28MHz. 6 points on 1.8, 3.5 and 7MHz between stations in different continents.
Scoring. 1 and 2 points respect between stations in the same continent but not in the same country.
Stations in the same country for prefix multiplier only.
Multiplier, by the number of prefixes, counted once only in the contest. VK1, VK2, etc. count as a prefix as do W1, W2 etc.
Final score = total QSO points x prefixes total.
One contact per station per band.
Certificates to highest scorers in each section in each country and each VK call area.
Logs. All times GMT. Show 18 hour non-operating time. Separate sheet for each band. Enter prefix multiplier the first time contacted only. Send prefix check list. Usual summary sheet and declaration.
All logs to CQ WPX SSB Contest Committee.
14 Vandeventer Ave., Port Washington. L1, NY. 11050, USA.
I would think the closing date — May 1st.

IARC Propagation Contest.

March 23rd 0001 GMT to March 31st 2400 GMT.
PHONE
Single band, all band, mobile and SWL, single op only.
Exchange, RS and Zone.
Scoring. One point per contact and a multiplier of one for each zone and IARC country contacted on each band. Your own zone counts for multiplier only.
The same station may be contacted as many times as desired but contacts must last more than 6 minutes or a fraction thereof. Each may be credited as a separate QSO and must be logged separately.
Use separate log sheets for each band and mode. GMT only. Logs and enquiries to L. M. Rundlett, K4ZA. 2001 Eye St. NW. Washington. DC 20006.

YL-OM Contest.

1800 GMT Saturday 9th to 1800 GMT Sunday 10th. CW only.
All bands. Exchange Serial No. RST and country.
Logs to Christine Haycock, WB2YBA, 361 Roseville Ave, Newark, NJ.07107, by April 30th.
Certificates to the highest scorer in VK.

Virginia QSO Party.

1800 GMT Saturday March 9th to 0200 GMT Monday March 11th.
The same station, Virginian I presume? may be contacted on each band and mode.
Exchange. QSO number. RS-RST and QTH.
One point per QSO. Multiplier, the number of Virginian's.
Frequencies. CW -60kHz from low end of each band. Phone. 3930, 7280, 14285, 21375, 28575. Even hours.
Certificates to highest scorers in each country.
Usual summary etc.
Logs by 15th April to Don Wiles, W4IML, 9801 Lomond Drive, Manassas, VA, 22110. USA.

AUSTRALIA and WORLD WIDE MOBILE CONTEST.

Syd, VK2SG, suggests a world wide mobile contest with provision for VHF operators.

To my mind a mobile-mobile contest is a must and I have wondered why there is not such a contest. Possible publicity may not be good from the safety angle but this could be overcome with a no-drive-operate rule.

One of my ambitions is to work mobile-mobile DX and perhaps you have that yen too? A contest would be one way of achieving that ambition.

Of course we don't just say "let's have a contest" and it is on. If the contest is to have WIA backing, Federal Council would have to review their responsibilities, and they are not inconsiderable, in the matter. The load on the Federal Contest Manager of that time would also have to be considered . . . but some could possibly be "farmed out".

I will let you see Syd's proposed rules next month for your comment.

HAVE YOU??

Have you forgotten to include your comments on the metrication of the Ross Hull VHF contest scoring distance table? If so get in touch with your Federal Councillor and give him your comments . . . Federal Council will meet at Easter but don't wait until then to give him your ideas.

A recent comment, in person, was to the effect that the Ross Hull contest was spread over too long a period?? What think you?

John Moyle Memorial National Field Day.

The way the weather is behaving in VK4 land, we will need boats to get out. Which brings up the question? Could a mobile marine become a field station??

BERU 1974

A reminder that this contest (CW) runs from 1200z 9th March to 1200z 10th March.

Details on Page 29, February AR.

Trophy medallions to VK winner and middle placing (1973 — VK3XB & VK6RV) ●

Ionospheric Predictions

with Howard Rider, VK3ZJY March, '74

This month's predictions from information supplied by the Ionospheric Prediction Service Division indicate point to point band openings for at least 50% of the month. Times quoted are G.M.T.

28MHz

VK2 to	KH6	0100 - 0600
VK3 to	VK9	0100 - 0700
VK4 to	KH6	2100 - 0700
VK5 to	VK9	0100 - 0700
VK6 to	SU	0700
VK7 to	VK9	0100 - 0700

21MHz

VK2 to	ZL	0200 - 0300
	SU	0400 - 0900
	ZS	0500 - 0900
	UA	0400 - 0900
	VK9	2100 - 0800
VK3 to	KH6	2100 - 0800
	G (SP)	0700 - 1000
	VE3 (SP)	2100 - 2400
	VK9	2100 - 0900
	ZL	2200 - 0800
VK4 to	SU	0400 - 0900
	KH6	2100 - 1000
	VK0	2300 - 0900
	W1	2000 - 2400
VK5 to	JA	2200 - 1000
	UA	0400 - 1000
	W6	2100 - 0300
	ZS	0500 - 1000
VK6 to	G (SP)	0700 - 1200
	PY	1000
	ZL	0100 - 0900
VK7 to	JA	2200 - 0900

14MHz

	9G1 (SP)	0700 - 0800	
	W1	2100 - 2400	
VK2 to	G (SP)	0700 - 1800	
	G (LP)	0800 - 1200	
	SU	0400 - 0900	
	VK0	2100 - 1100	
	W1	2000 - 2400	
	ZL	2000 - 1100	
VK3 to	JA	0500 - 1700	2100 - 2400
	VE3 (SP)	1900 - 1700	
	VE3 (LP)	2200 - 0100	
	VK9	2000 - 1700	
	UA	0800 - 1800	
	ZS	0400 - 0800	1000 - 1200
VK4 to	W6	0400 - 0600	1900
	VK0	2000 - 1300	
	ZS	0400 - 0800	1000 - 160
	JA	0500 - 1700	2100 - 2300
VK5 to			
KH6		0400 - 1300	2000 - 2100
PY		2200 - 0700	0900 - 1200
9G1	(SP)	2200 - 0300	0500 - 0600
9G1	(LP)	0700 - 1100	1600 - 1700
VK6	to		
PY		2300 - 0600	0800 - 1300
UA		0900 - 1800	
W1		1300 - 1800	2200 - 2300
ZL		2200 - 1200	
VK7	to		
G	(SP)	0900 - 1600	
SU		1100 - 1300	
VK0		0200 - 0800	
W6		0300 - 0600	1900

7MHz

VK2 to		
G (SP)		1600 - 2000
W6		0700 - 1500
VK3 to		
JA		0900 - 2000
9G1 (SP)		1800 - 2100
VK4 to		
VK0		0600 - 2100
PY		0800 - 0900
VK5 to		
KH6		0800 - 1700
VE3 (SP)		0800 - 1300
VK6 to		
ZL		0900 - 2000
SU		1500 - 2300
VK7 to		
VK9		0600 - 2100
UA		1400 - 2100

Hamads

* Eight lines free to all W.I.A. members.
* Copy should be in block letters or typescript, signed and forwarded to The Editor, P.O. Box 150 Toorak, Vic., 3142.
* QTHR means that the advertiser's name and address are correct in the current Australian Callbook.

FOR SALE

GONSET GSB-100 100 W PEP SSB/CW xmtr 80-10m good condx w/spare 6DQ5 final tube $200.

Philips EL3542 tape recorder w/accessories, good condx $75. You pay freight. VK4ZV, QTHR. Ph. (072) 82 2951. AH (072) 80 2697 bus.

Winch up Tower, 42 feet, in excellent condition, and one Stolle type 201G rotator, new. W. Ryan, 6 Olive Court, Nambour, Qld., 4560.

B & W low pass 4 section filter, 2kW rating; **B & W** six position coaxial antenna switch, 2 kW rating which earths all unused connectors; **DM-26** Jap dynamic microphone with desk stand, particularly suited for SSB; **Penwood** 24 hour revolving digital clock. All in as new condition; going cheap as surplus to requirements. Roth Jones, 1 Albert Road. Melbourne, 3004.

Yaesu FT101 160-10m Transceiver, 240 and 12.6V power delivered new August '73. Absolutely unmarked. little used, complete with original packing, correct English Manual, unused connectors, etc. $475 cash. VK5IK, QTHR, Ph. Eudunda 252.

Yaesu FT200 Transceiver, complete with PSU and all crystals for 10 metres. Current model only 18 months old. $295.00. VK1JL. QTHR.

Trio TR2E AM 144-148 Mc transceiver tunable or crystal locked. 1 xtl, MIC, handbook. good condition. $150. ONO. VK2BGP. QTHR Ph.: (02) 648-4547 (Bus.).

WANTED

Rotator CDR HAM-M or High Gain 400, beam, TH6DXX Balun BN86.

Alternator Honda E600 or similar. Please state condition & price. VK3AXA. QTHR. Ph: (059) 42 7248

Crank-up Tower, Hills 60 ft. or similar. VK3ARW. QTHR (02) 44 7582

Handbook or loan of copy, for Marconi TF801-A sig. gen. VK3YAZ, QTHR, (03) 25 2689.

Receiver, BC348, BC224 or R1155. L. T. Swain. VK2CS. QTHR. Ph.: (049) 59 1629

20 Years Ago

with Ron Fisher VK3OM

MARCH 1954

Here at last—the first edition of the Australian Radio Amateur Call Book. A full page advertisement in March, 1954 Amateur Radio announced its arrival. I wonder how many can remember the cover with its collection of "WI" QSL cards from each State of Australia plus VK9WI. The price? Forty Five cents or as we knew it then, four and six pence.

The Call Book has been an "In" part of Australian Amateur Radio ever since.

DX highlights for March reports that Fanning Island now has amateur activity with the call sign of VR3D. This was the beginning of a very active few years for Fanning with Ray Baty VR3A commencing operation a year or so later. Rao de Oro and Cocos Island were also showing signs of life at this time. DX Band conditions were reported as poor and erratic. On VHF, things were better with good interstate openings on six metres.

Mention was made last month of the proposed VK7WI operation from the Hobart Science Exhibition. A full report appeared. Because of the high electrical noise level in the Hall, a remote receiver complete with remote tuning was used—just as well they had AM in those days, SSB would be hard to resolve with an up/down stop switch.

'A one metre Superheterodyne', R Porter VK5PU showed how to convert the ASB4 receiver to cover this band.

The ASB4 was a disposals radar receiver easily obtainable at that time. The second part of G. W. Steane's "Recording Tape" series discussed azimuth adjustment, recording heads and frequency response. Also in its second part was Tom Athey's "Complete Amateur" with details of the crystal oscillator and multiplier stages.

A simple and effective "S" Meter. Indeed it was just a 50 to 200 micro-amp meter used to read the voltage on the AGC line. A half meg potentiometer was used to adjust the sensitivity of the circuit. D. Beadel VK9DB, wrote up the idea.

Two advertisements are worth referring to, first, Mullard listed their new range of Subminiature valves. They came in either 6.3 volt or 1.25 volt filament types. I believe these tubes were used to some extent in Military gear—but they didn't find any application in Amateur equipment that I know of. In another advertisement I noted 12AT7 valves priced at $3.25. Well, perhaps things are not so bad after all.

Silent Keys

Mr. F. E. BENTLEY	VK5MZ
Mr. M. F. HIDER	VK5SWL
Mr. J. H. POWER	VK3AFP
Mr. A. HARTLEY	VK2VY
Mr. R. E. STACEY	VK4RS

OBITUARY

C. NEWTON KRAUS W1BCR

Many VK amateurs will be saddened to learn of the sudden passing of W1BCR, C. Newton Kraus, at his Toulaset Point, Rhode Island, home on 18 December, 1973.

Newt's 20 metre signal on 14258kHz was possibly the most consistent S9 plus signal received from U.S.A. over a very long period. Some of the VK regulars have recorded over 1000 QSO's with Newt but he was equally concerned to exchange reports and ragchew with an operator making his first contact.

Newt was in his late 60's and lived alone in a typical timber shingled two storey Rhode Island cottage set on a headland about 50 feet overlooking the sea. Amateur radio was his major interest and his sleeping habits were often regulated by the prevailing DX conditions. He had been licensed and active for over 50 years.

The outstanding signal in Australia from W1BCR, but due in no small part to a very efficient Vee beam. This antenna with legs over 500 feet long was directed on Sydney and extended from a 40ft pole at the shack over the water to terminate on piles driven into the sea bed. The exciter (Collins) receiver (Collins) and a miscellany of logs, station records, mementos and curios occupied the living room while the ample linear (a modified broadcast transmitter) was housed in an adjacent room directly under the antenna termination.

An individual card record was maintained for every contact made and was updated after each QSO. Newt not only knew who you were and your equipment history but through a remarkable collection of maps he was able, in many cases, to pinpoint your precise QTH. I recall him instructing a VK operator on the preferred route to another QTH.

Having never visited Australia Newt's knowledge of Australia and Australians was remarkable and was evidence of the intense reading that was a part of his life and that was so apparent to those of us who have been privileged to meet him personally.

Outside amateur radio activity Newt was actively involved in US Navy associations, cooking (Australian roast lamb was a favourite) and the care for and preservation of bird life around his QTH.

Newt will be sadly missed by many operators, particularly Australians. His passing, too, will be a deep personal loss for Paul (W1FX) who maintained a close personal association.

I. W. Jay, VK3ZB

YAESU VHF

CURRENT MODELS

MODEL FT-620 six metre SSB/AM transceiver, 50-54MHz capability in 8 segments, equipped for 52-54MHz. May be operated from 234V AC or 13.5V DC. Includes built-in VFO, noise blanker, speaker and microphone.

MODEL FTV-650 six metre transverter, 50-54MHz capability in 8 segments, equipped for 53-54MHz. Designed as an auxiliary unit with a Yaesu transceiver or transmitter/receiver combination on tunable ranges covering 28-30MHz. Power is derived from driving unit.

MODEL FT-2FB two metre FM, fixed channel transceiver, 12 channels capability, equipped for three channels, installed ready to operate. Operates from 12V DC in mobile service. Matching AC power supply Model FP-2 is also available for base use. Microphone included.

COMING SOON Model FT220 two metre SSB/FM/CW transceiver

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S.A.	FARMERS RADIO PTY. LTD., 257 Angas Street, Adelaide, 5000	Ph. 23 1268
W.A.	H. R. PRIDE, 26 Lockhart Street, Como, 6152	Ph. 60 4379

MARCH, 1974

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